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FM 6-20-1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 5 July 1979

Field Artillery Cannon Battalion

Unless otherwise noted, where the third person singular is used in this publication, the word "he" will be understood to stand for both masculine and feminine genders.

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TABLE OF CONTENTS

		Page
	Introduction	v
Chapter 1.	Field Artillery Cannon Battalion Operations	1-1
	Target acquisition	1-3
	Meteorology, survey, and technical fire direction	1-7
	Tactical fire direction	1-11
	Field artillery fire planning	1-16
	Plans and orders	1-17
	Positioning	1-24
	Reconnaissance	1-29
	Displacement	1-30
	Communications	1-32
	Combat service support	1-32
	Survivability	1-33
Chapter 2.	Offense	2-1
	Offensive fundamentals	2-1
	Enemy defensive tactics	2-7
	Forms of offensive maneuver	2-9
	Types of offensive operations	2-12
	Movement to contact	2-17
	Hasty attack	2-22
	Deliberate attack	2-24
	Exploitation and pursuit	2-29
Chapter 3.	Defense	3-1
	Defensive fundamentals	3-1
	Enemy offensive tactics	3-6
	Defensive maneuver and operations	3-9
	Covering force	3-12
	Main battle area	3-15
	Supporting light infantry in the MBA	3-19
	Delay and withdrawal operations	3-21
Chapter 4.	Operations Security	4-1
	Enemy intelligence	4-1
	OPSEC planning	4-2
	OPSEC countermeasures	4-5
	Electromagnetic intelligence	4-11
	Evaluation	4-13
	Recognition and identification of forces on the battlefield	4-13

Page

Chapter 5. Combat Service Support Operations 5-1

Organization for combat service support 5-1
Trains operations 5-5
Supply operations 5-8
Maintenance operations 5-17
Personnel support and administration 5-20
Medical support 5-21
Other services 5-22

Chapter 6. How to Train to Fight 6-1

Training philosophy 6-1
Training materials 6-3
Responsibilities 6-8
Training management 6-9
Battalion training 6-9
The training crosswalk 6-15

Appendix A. Divisional and Nondivisional Cannon Battalions A-1

Divisional cannon battalions A-1
Separate brigade cannon battalions A-8
Nondivisional cannon battalions A-12

Appendix B. Functions of the Primary Staff B-1

The battalion staff B-1
Staff functions B-2

Appendix C. Communications C-1

Communications-electronics responsibilities C-1
Communications-electronics staff officer C-2
Battalion communications platoon C-3
The battalion telecommunications center C-3
The battalion communication system C-3
Communications operations C-5

Appendix D. The Cannon Battalion in Special Environments and in Support of Special Operations D-1

Military operations on urbanized terrain D-2
Arctic environment D-4
Desert environment D-6
Mountain environment D-8
Jungle environment D-10
Nuclear and chemical environment D-12
Airborne and airmobile operations D-14
River crossing operations D-16
Support of allied maneuver forces D-18
Counterguerrilla operations D-20
Amphibious operations D-22

Page

Appendix E. Road Marches E-1

Planning E-2
Training E-2
Standing operating procedures E-2
Preparing for road marches E-2
March columns E-3
March organization E-4
March column control E-5
Road march planning factors E-8
Movement order E-15
Road movement graph E-16
Road movement table E-17

Appendix F. Tactical Scenarios F-1

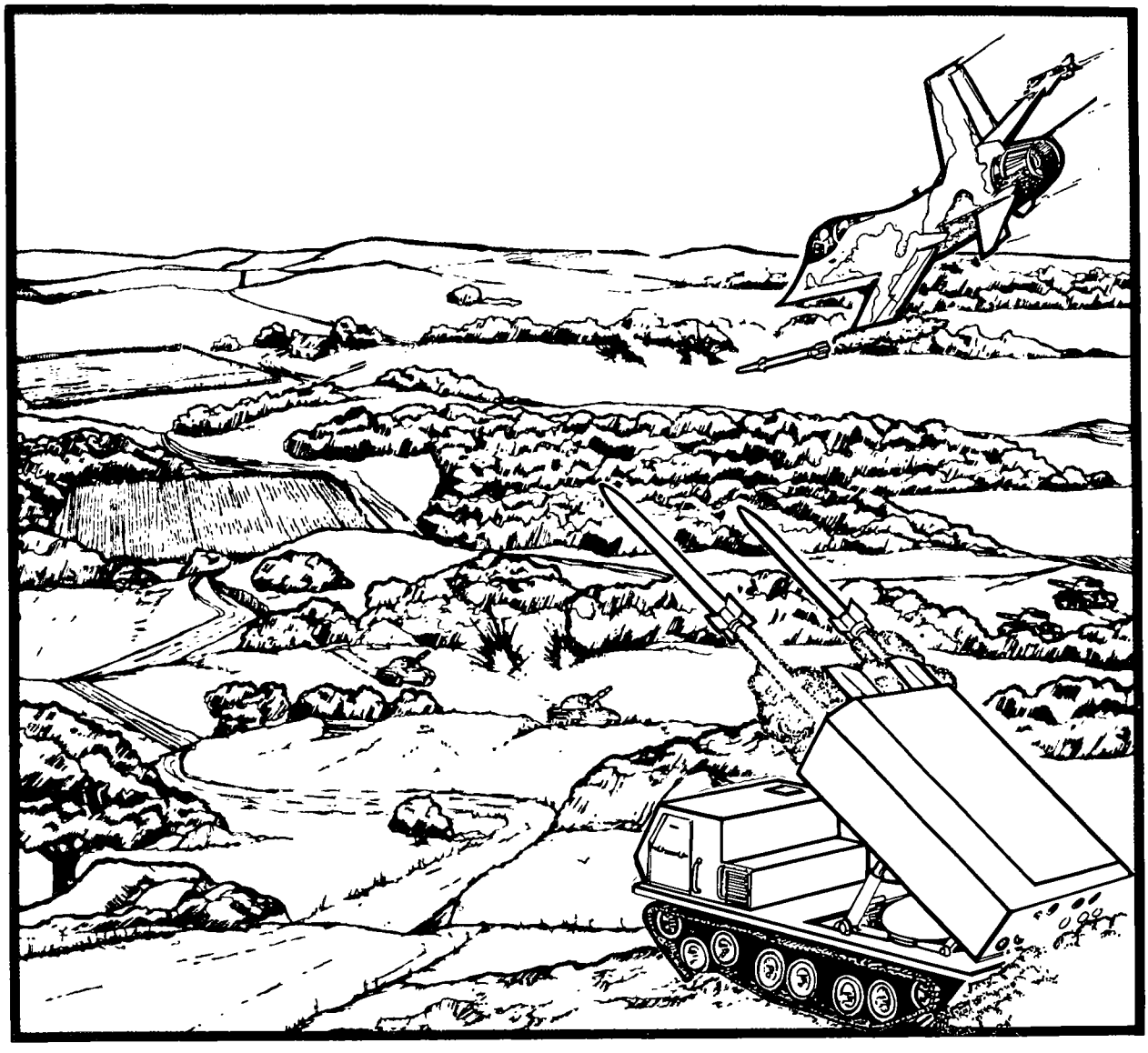
Movement to contact scenario F-2
Deliberate attack scenario F-13
Exploitation/pursuit scenario F-23
Covering force scenario F-30
Main battle area scenario F-43

Appendix G. Glossary G-1

Appendix H. Relevant References H-1

Appendix I. Standardization agreement 2129 ..... I-1

INTRODUCTION



In the battles of the next war, effective use of firepower will be more critical than in any land battle the US Army has ever fought.

Changes in battle tempo, mobility, and firepower will challenge field artillerymen as never before as they plan, coordinate, and execute fire support.

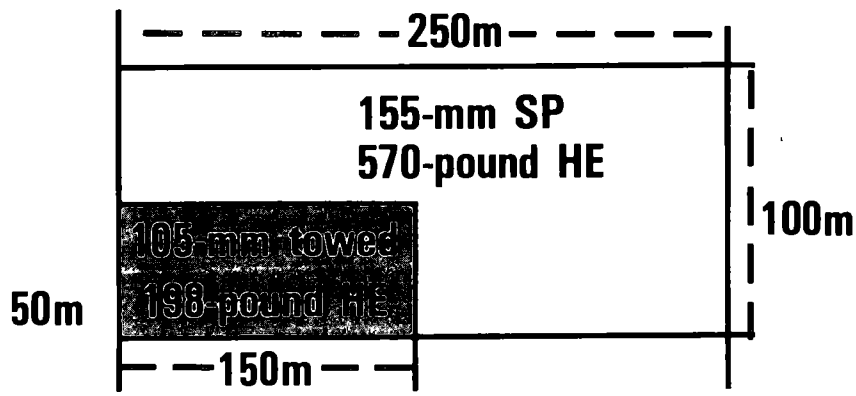
The firepower that can be provided by cannon artillery has increased significantly as a result of more lethal munitions, better accuracy, and increased range.

CANNON FIREPOWER HAS BECOME MORE LETHAL.

Coverage area:

1970s: 25,000 square meters

W WII: 7,500 square meters

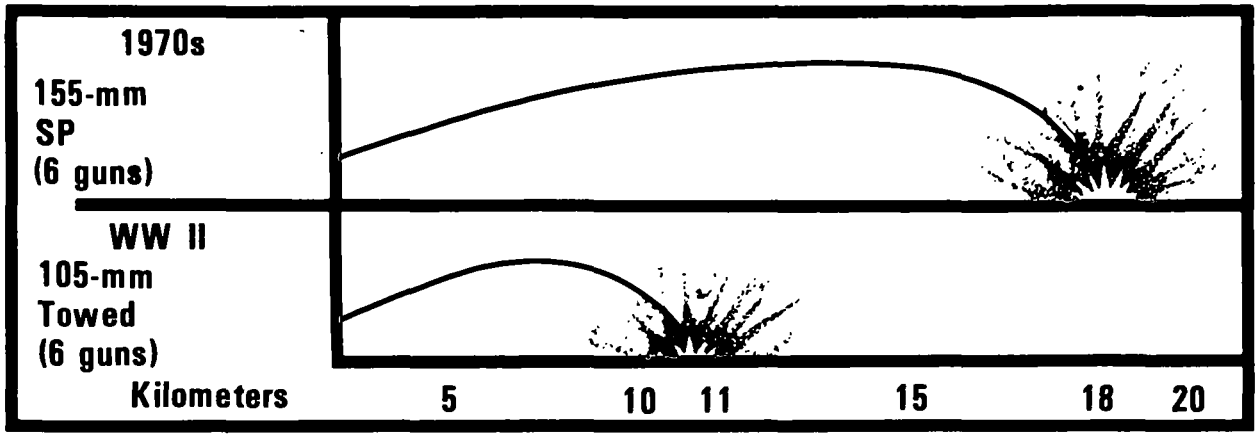


MOST CANNON ARTILLERY IS MORE ACCURATE.

Caliber	World War II	1970s
105-mm	22.1	14.6
155-mm	25.8	11.4

Accuracy ratios by Circular Error Probable (CEP) (charge 7 at 7,000 meters)

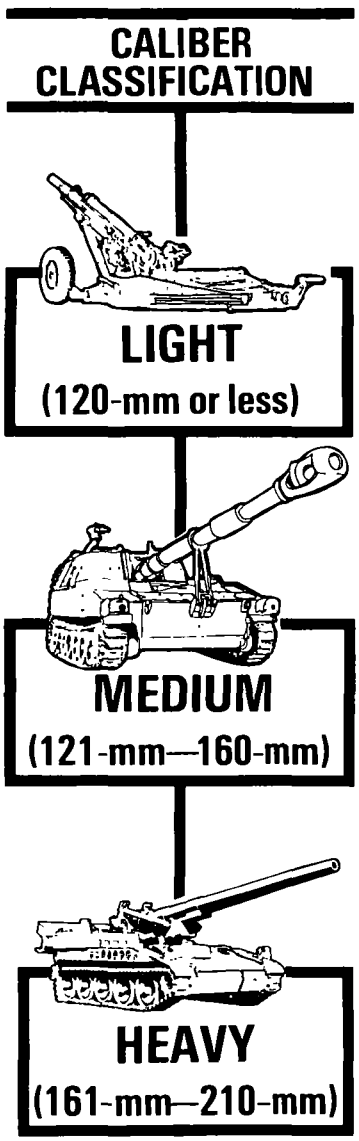
CANNON BATTALIONS OF HEAVY DIVISIONS HAVE AN INCREASED RANGE CAPABILITY



Cannon battalions are found in all US Army corps, divisions, and separate maneuver brigades. They are generally organized with a headquarters battery to provide for command control and some combat service support, a service battery to provide other combat service support, and three firing batteries to provide the firepower. In some battalions, the headquarters and service batteries are combined with a single headquarters and service battery.

Tables of organization and equipment detail manpower and equipment authorizations for US Army units. However, all Army units are organized under modified tables of organization and equipment (MTOE). To determine manpower and equipment authorizations for a specific unit, it is necessary to refer to the authorization document (MTOE) for that unit.

Cannon battalions are in armored, mechanized, infantry, airborne, and air assault divisions. They are also in field



artillery and separate maneuver brigades. US Army cannon battalions can be classified into three categories according to the caliber of the cannon in the battalion. As a general rule, light and medium battalions are in infantry, airborne, and air assault divisions; medium and heavy battalions are in armored and mechanized infantry divisions.

Cannon battalions are part of a combined arms team of tanks, infantry, cavalry, air defense, and field artillery. They are organized to deliver a variety of nuclear and nonnuclear munitions in support of maneuver arms.

This manual describes how cannon battalions fight, how they are organized, and how they operate to support combined arms operations. Battle in Central Europe against forces of the Warsaw Pact is the most demanding mission the US Army could be assigned. Because the US Army is structured primarily for that contingency and has large forces deployed in that area, this manual is designed mainly to deal with such operations. The principles set forth in this manual, however, apply to military operations anywhere in the world.

CHAPTER 1:

Field Artillery Cannon Battalion Operations

The mission of the field artillery is to destroy, neutralize, or suppress the enemy by indirect fires and to integrate all fire support into combat operations. Successful execution of this mission demands effective integration of field artillery fires into the scheme of maneuver and swift, exact execution from the time a target is acquired until ordnance is delivered on target.

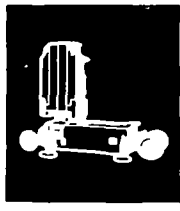
IN SUPPORT OF THE FIELD ARTILLERY MISSION, THE FIELD ARTILLERY CANNON BATTALION PROVIDES:

- ☐ Close support to maneuver units in combat.
- ☐ Counterfire against enemy indirect fire systems.
- ☐ Fires on enemy command posts and logistical installations.
- ☐ Fire support planning and coordination resources and facilities to all levels of supported maneuver elements.

For the cannon battalion to support maneuver forces on the battlefield successfully, it must accomplish 10 basic tasks.

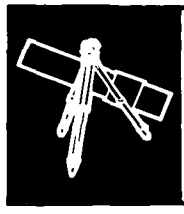
This chapter will discuss field artillery cannon battalion operations in terms of these 10 tasks and how to survive to perform them.

CANNON BATTALION BASIC TASKS

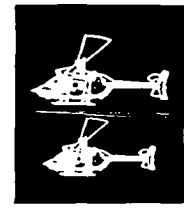


TARGET ACQUISITION

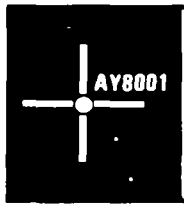
POSITIONING



METEOROLOGY, SURVEY, TECHNICAL FIRE DIRECTION

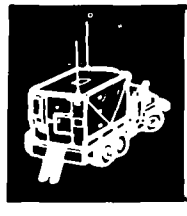


RECONNAISSANCE



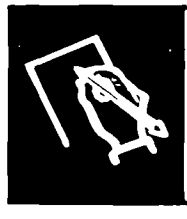
AY8001 FIRE PLANNING

DISPLACEMENT



TACTICAL FIRE CONTROL

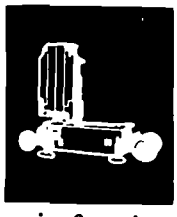
COMMUNICATIONS



PLANS AND ORDERS

COMBAT SERVICE SUPPORT

Target acquisition.



The purpose of target acquisition (TA) is to develop target locations with sufficient accuracy so that they can be attacked. Direct support (DS) and reinforcing battalions are primarily interested in detecting and engaging targets that threaten maneuver elements of the supported brigade; e.g., antitank guided missile (ATGM) positions, observation posts (OP), and artillery units. General support (GS) and general support reinforcing (GSR) battalions are primarily interested in targets that concern the entire division; e.g., division combat outpost locations, divisional second echelon regiments, and artillery units. For a detailed description of target acquisiton operations, see FM 6-121 *Field Artillery Target Acquisition.*

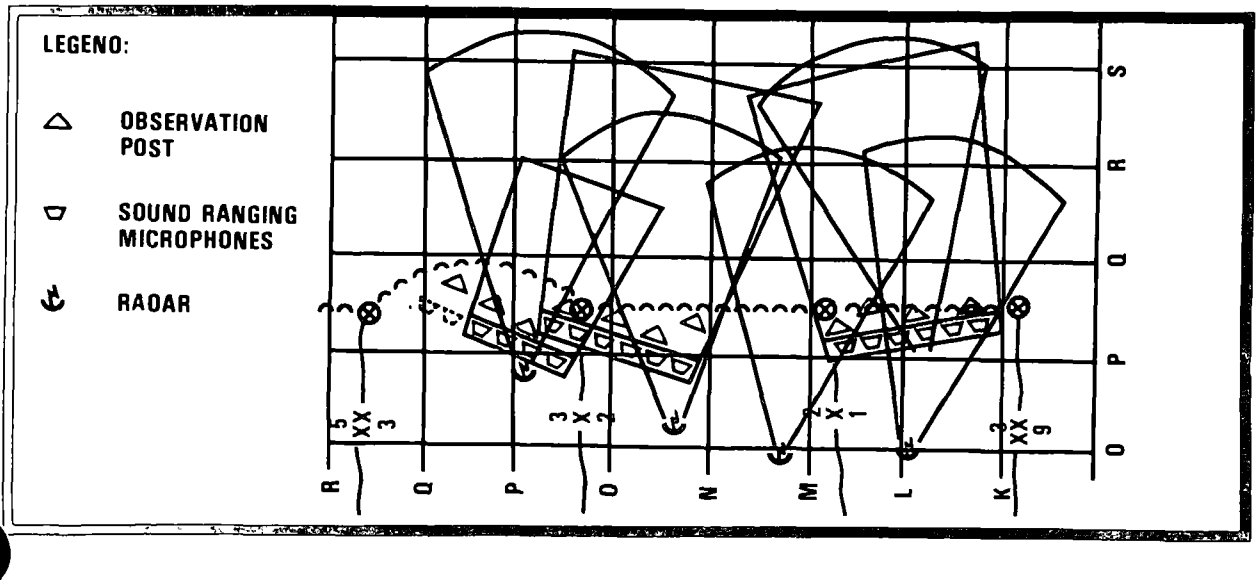
Organic resources.

S2. The battalion intelligence officer (S2) is the target acquisition staff coordinator. He insures that organic or attached target acquisition resources are used efficiently and effectively.

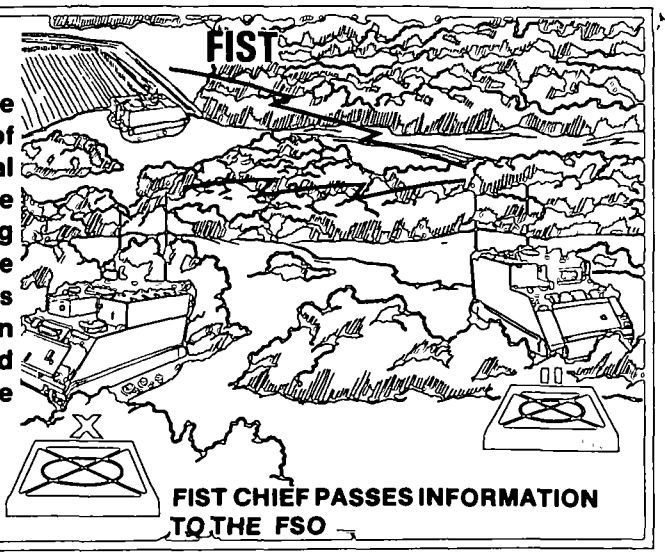
The S2 works with the fire support officers (FSO), fire support teams (FIST), liaison sections, maneuver unit S2s, adjacent units, battery fire direction officers (FDO), and any other targeting information source. He works closely with the supported unit intelligence officer to provide the best target acquisition support for the operation.

A target acquisition capabilities chart may be prepared using visibility diagrams from radar sections and observers. This chart is used to plan coverage for unobserved areas. A copy is sent to the division artillery tactical operations center (TOC).

TARGET ACQUISITION CAPABILITIES CHART



FIST. Fire support teams located with the supported companies are important parts of the target acquisition effort. They are principal sources of visually acquired targets for the battalion and have direct access to targeting information from other personnel of the company. Normally, the FIST chief reports information directly to the maneuver battalion fire support officer. The maneuver brigade and battalion FSOs pass this information to the direct support battalion S2.

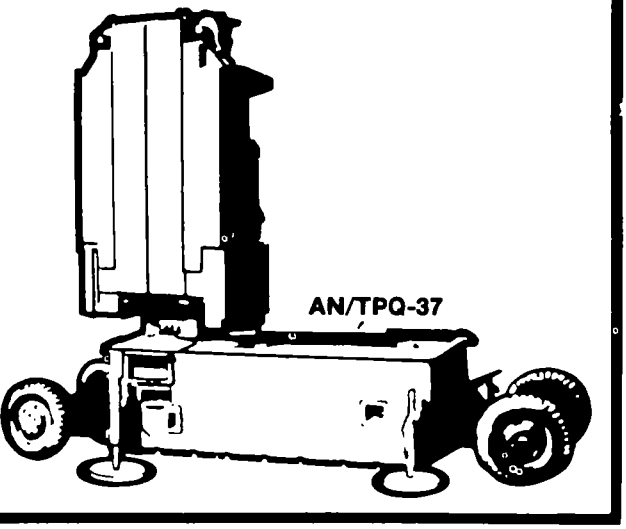


Observation posts. When survey requirements are complete, battalion observation posts should be established and manned by personnel from the survey section. The observers can provide valuable target intelligence, call for fires, and maximize observation capabilities. The S2 briefs personnel who will operate the OPs, designates the location of the battalion OP, and coordinates the search for targets. Each OP completes a visibility diagram and, if directed, submits it to the S2. The S2 integrates these diagrams into the target acquisition capabilities overlay before it is sent to division artillery. FM 6-121 discusses visibility diagrams and target acquisition capabilities overlays in detail.

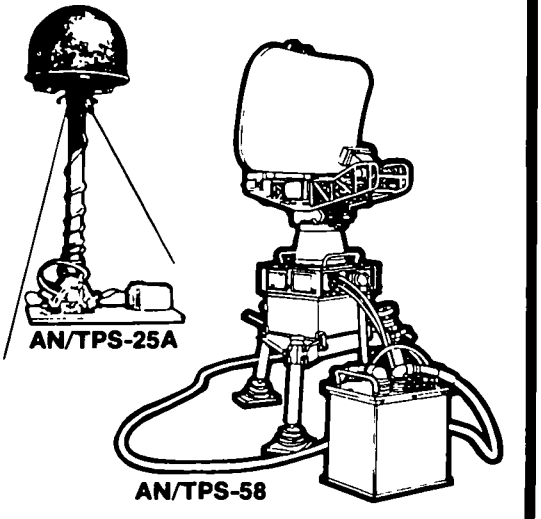
Nonorganic resources.

Weapon locating radar. Weapon locating radars (WLR) will often be attached to cannon battalions. The S2, working with the S3, determines the general position and sector of search of the radar. The radar technician then sites the radar on the ground to maximize effectiveness and minimize vulnerability. The battalion survey section provides survey to the radar as soon as possible, or the radar section uses hasty survey to become operational. The radar reports targets to the battalion fire direction center (FDC) where the target is either attacked or passed directly to the division artillery tactical operations center for attack.

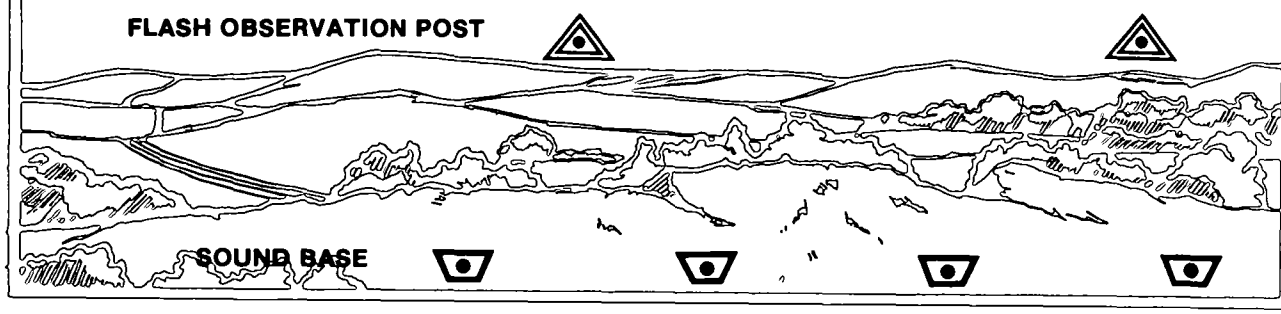
To decrease its vulnerability to enemy direction-finding (DF) means and subsequent attack, the radar should be turned on only when enemy mortars and artillery are active. All personnel must be trained to notify the operations/fire direction center (ops/FDC) immediately of hostile firing, so the ops/FDC can notify the radar of the activity and the sector and direction in which it is occurring. This process is called *cuing*. The radar operator then turns on his radar and acquires the enemy firing unit.



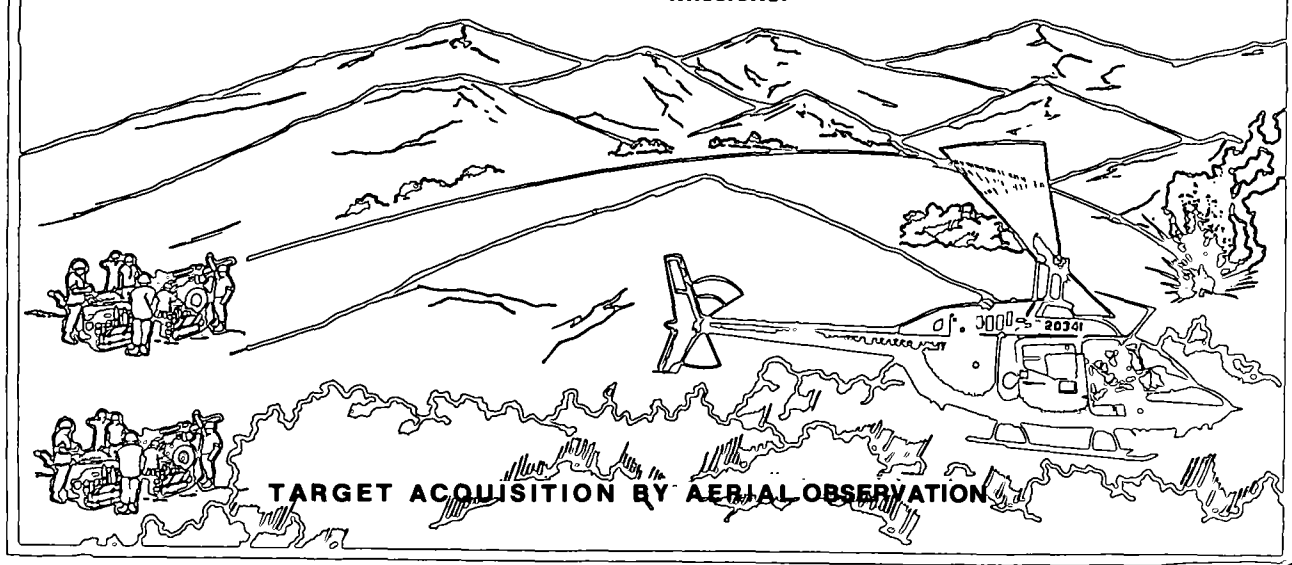
Moving target locating radar. The moving target locating radar (MTLR) is usually employed in general support of the division, but usually it is attached to or located with a cannon battalion because of positioning considerations and support requirements (e.g., security and survey). When the radar is attached to a battalion, the employment considerations for the moving target locating radar are generally the same as for the other radars. FM 6-121 contains additional information on field artillery radars.



Sound and flash ranging. Sound and flash platoons normally are employed in general support of the division. However, they may be attached to or report to a cannon battalion in certain situations, such as during establishment of a hasty sound base prior to completion of survey. Under these conditions, the sound base cannot provide hostile battery locations with sufficient accuracy to justify fire for effect (FFE) but can adjust fire on hostile batteries using sound-on-sound adjustment (usually within one or two adjustments) or observed fire procedures. Targets developed using the sound and flash platoon can be either attacked or passed directly to the division artillery TOC for attack.

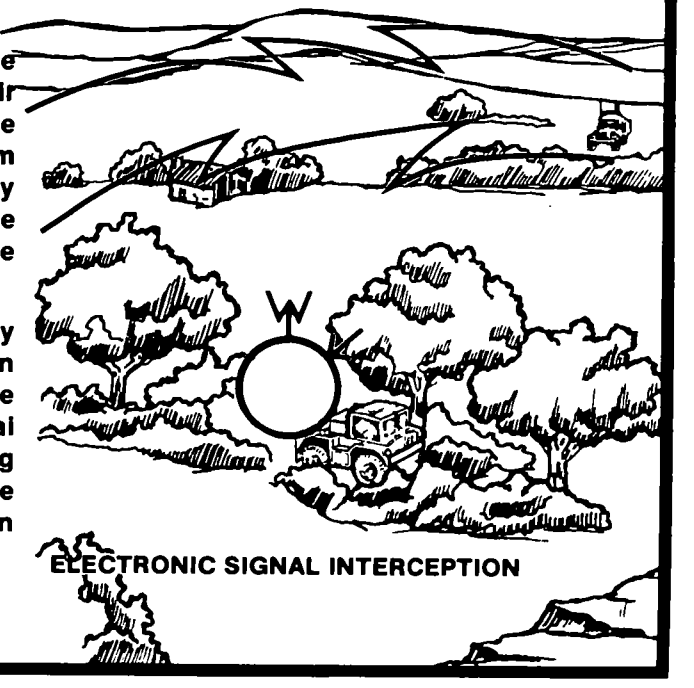


Field artillery aerial observers. Aerial observers have the capability to acquire targets not visible to ground means and to cover large areas rapidly. They are particularly useful in supporting fast-moving situations when they can fill in the gaps between and see deeper than FIST observers. Field artillery aerial observer (FAAO) support should be requested from division artillery when other systems cannot provide the desired results. In an active enemy air defense environment, aerial observation may be severely limited unless provisions are made for the suppression of enemy air defense for the duration of the missions.



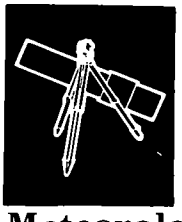
Electronic warfare. Electronic warfare (EW) systems can acquire targets through their analysis of electronic emissions and message traffic. These sites require survey support from the field artillery. Division artillery survey sections can provide this support or coordinate with the battalion closest to the site to provide the survey.

On occasion, the division artillery TOC may arrange for certain kinds of target information to be sent directly from the electronic warfare intelligence operations center to a general support or general support reinforcing battalion. These arrangements would include guidance for attack of the targets. Fast reaction to these *event-triggered reports* is essential.



ELECTRONIC SIGNAL INTERCEPTION

Meteorology, survey, and technical fire direction.

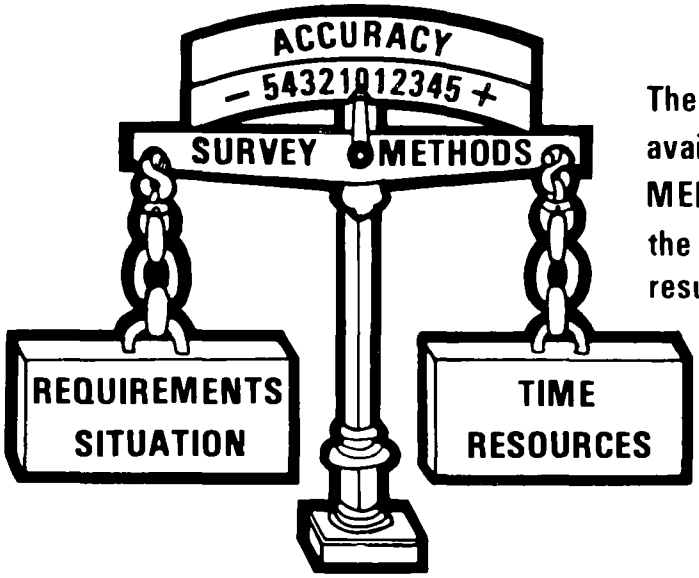


The S3 insures that FDCs have the information they need to conduct effective fire direction. This information includes:

Meteorology (MET). Met messages provide information on atmospheric conditions that affect projectile trajectories and the efficiency of some target acquisition equipment. These messages will be sent to the battalion over the field artillery brigade or division artillery command fire net, amplitude modulated radio teletypewriter (AM RATT). Battalion ops/FDC section must forward the met message to the firing batteries to insure rapid dissemination and use for accurate massed fires. Validity of met data will vary depending on the distance between the station and the firing elements. Based on the location of the met station and the cannon battalion, the S3 must determine whether to use or disregard the data. See FM 6-15, *Field Artillery Meteorology*.

Survey. Survey is the means to accurate locations and directional control for weapons and target acquisition means. Survey establishes a common grid and direction, which allow massing of fires.

The field artillery battalion survey section is responsible for providing survey control to all of the firing elements and attached radars. A target area and connection area survey (described in FM 6-121) will also be conducted when possible.



The amount of TIME and RESOURCES available, balanced against REQUIREMENTS and the SITUATION dictate the SURVEY METHODS and the resultant accuracies.

Normally, division artillery survey will provide starting control for battalion operations; however, this control frequently must be assumed and the survey converted to common control. Control will be determined using the most reliable sources available.

The commander's guidance for survey must be clear in advance of the operation.

For example: What will be the policy for surveying alternate, supplementary, and offset registration positions? How many OPs must be surveyed? Much of this guidance can be maintained in the unit standing operating procedures (SOP), but it is the guidance from the commander and the subsequent supervision that will insure adequate survey. A decision how and where to survey may depend on several factors:

Mission/accuracy. The mission of survey is to place target acquisition means, firing units, and targets on a common grid system. In his mission analysis, the commander will give guidance to survey personnel concerning the use of hasty versus deliberate survey techniques.

Time. The time available to complete the survey operation is the most critical factor in planning. Survey leaders should use the survey techniques necessary to provide the best survey data within the prescribed time. A tradeoff between accuracy and time limitations may be made depending on the tactical situation.

Weather. Fog, rain, snow, or dust can reduce optical instrument visibility. Reduced visibility requires shorter

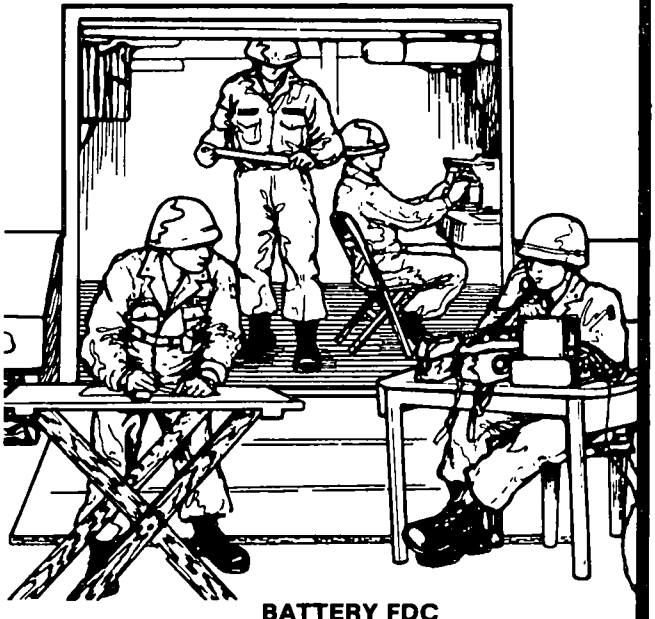
distances between stations and more angle turning. During periods of poor visibility, the commander may choose to put his survey effort on locating his weapon locating radar accurately so that it can locate his firing units. In this situation, the survey instrument azimuth gyro lightweight would be used to establish common direction. Extreme heat or cold can also reduce survey party personnel efficiency, thus increasing the time needed to complete the survey.

Tactical situation. The enemy and friendly situations have a strong influence on survey operations, since the disposition of troops may interfere with or restrict movement of survey personnel and their equipment. Restrictions on communications, such as radio silence, can greatly reduce the effectiveness of survey parties. The capabilities of the enemy to interfere with survey operations by denying the use of terrain or routes are of prime importance. During periods when survey operations are restricted, the commander could give priority of survey to those units supporting the main attack or the most vulnerable area.

Registrations provide accurate firing data. There are several ways to register:

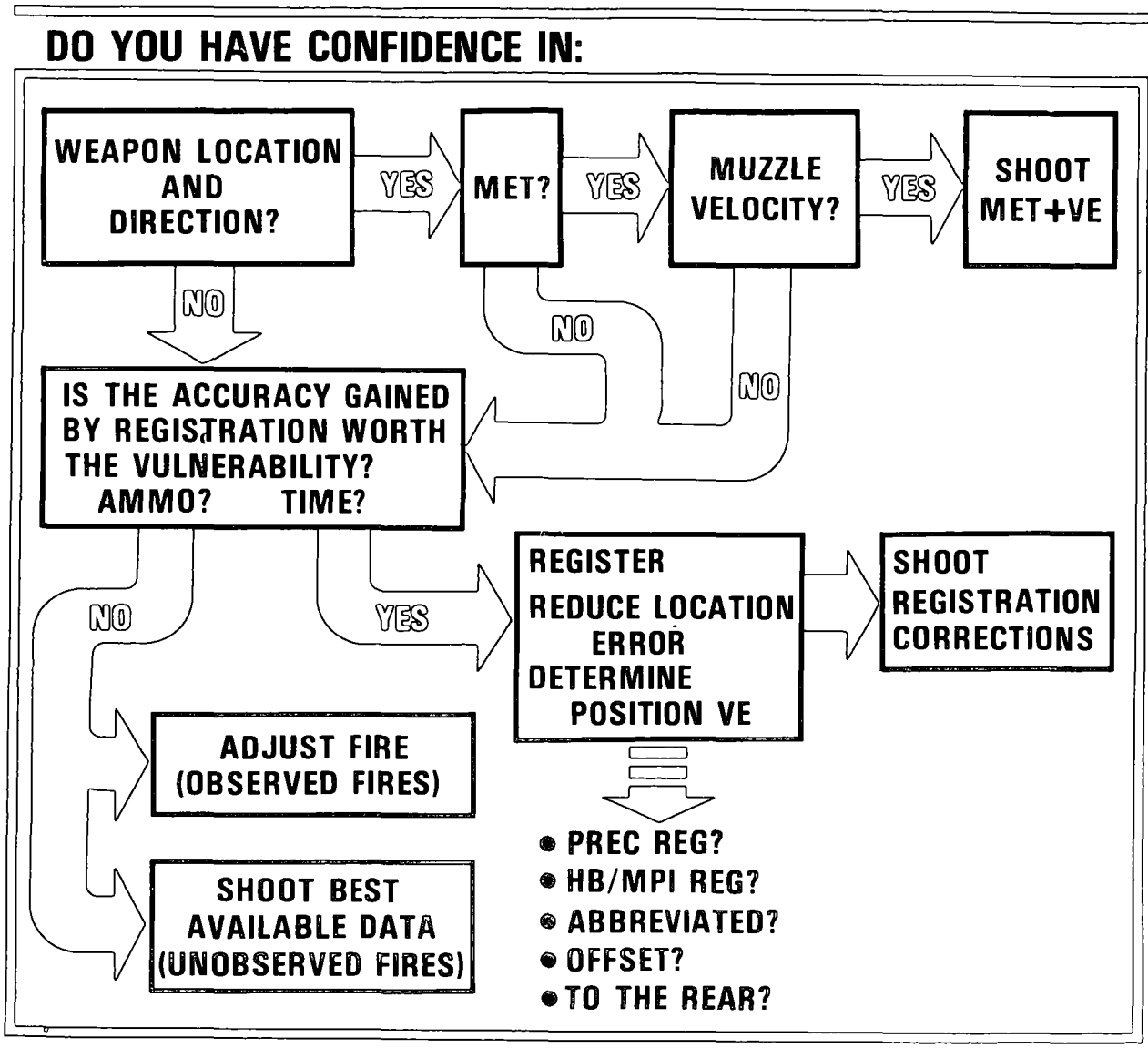
- **Precision, high-burst (HB), or mean-point-of-impact (MPI) registrations.**
- **Abbreviated HB/MPI or precision registrations.**
- **Offset registrations.**
- **Registrations to the rear also using abbreviated or complete precision, HB, or MPI techniques.**

Technical fire direction. Technical fire direction is the process of converting weapons and ammunition characteristics (muzzle velocities, propellant temperature, and projectile weight), weapon and target location, and meteorological information into firing data. The results are time, deflection, and quadrant. Battery and battalion fire direction centers both have a technical fire direction capability. Batteries normally conduct technical fire direction using Field Artillery Digital Automatic Computer (FADAC) with battalion providing tactical fire direction and technical assistance in case of overcommitment or breakdown. Detailed procedures for computing firing data are in FM 6-40, *Field Artillery Cannon Gunnery.*



BATTERY FDC

Registrations, however, provide the enemy a good opportunity to locate firing units. When it is necessary to decide whether to register or not, the following chart may serve as a guide.



The advantages and disadvantages of each type of registration are discussed in detail in FM 6-40.

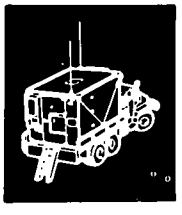
All the met, survey, registrations, and precise technical fire direction procedures are degraded if the weapons are not capable of performing as they are designed to perform.

Weapon calibration improves firing accuracy. Using valid muzzle velocities and current meteorology data combined with a precision registration, the battalion can deliver accurate massed surprise fires. Chronographs used to determine muzzle velocity are found in the division artillery and corps support

command direct support units. All weapons should be calibrated as often as situation, time, ammunition, and changes in velocity errors (VE) indicate. When this is not practical, usually weapons can be calibrated for those charges most frequently used.

Fire control alinement tests insure that cannons can be laid accurately on the target. These tests frequently are overlooked in the heat of battle, but the most current meteorology, muzzle velocity, and registration data will not help if weapons are not pointed in the right direction. Technical manuals contain detailed descriptions of these tests.

Tactical fire direction.



Tactical fire direction includes selection of number of rounds, shell/fuze combination, and designation of units to fire.

Control policy. The cannon battalion commander should establish a clear policy that states the degree to which centralized control should be exercised by battalion fire direction center. Control may range from a highly centralized situation, in which all fire missions are sent to the battalion FDC where data is computed and fire commands sent to batteries, to a totally decentralized mode, in which both tactical and technical fire direction are conducted at battery level and battalion FDC monitors and interrupts only if a change is necessary.

In recommending a *policy on the degree of control* exercised by battalion FDC, the S3 should consider:

- **The quality, experience, and state of training of the battery and battalion FDC. The better the battery FDC, the more decentralization is possible.**
- **The tempo of battle. In rapidly moving situations, decentralization will increase responsiveness.**
- **The existence of operations orders and SOPs outlining the number of rounds and shell/fuze combinations for the attack of specified types of targets.**
- **The reliability of communications between observers, the battalion FDC, and battery FDCs. Inability to communicate with the battalion FDC will result in less centralization.**
- **The extent to which the operations being supported are centralized or decentralized. The more centrally controlled the operation, the more centrally controlled fire direction must be.**

Battalion fire direction officer. The battalion FDO supervises the fire direction center. Based on the nature of the target and the guidance of the battalion commander and/or the S3, the FDO will decide when to mass fires and determine or approve number of rounds and shell/fuze combinations regardless of whether the mission was sent to the battery or to the battalion. The FDO is responsible for insuring that the batteries and battalion have the same data, both computer and manual.

Operations section. The S3 is also responsible for the operations portion of the operations/fire direction section. The operations section prepares the *field artillery support plan* (when assigned the DS mission), maintains the target list worksheet for the battalion, prepares scheduling worksheets (groups, preparations, series, etc.), and plans and coordinates all other battalion operations, such as movements and occupations of positions. See FM 6-20, *Fire Support in Combined Arms Operations.*

Processing fire missions. When targets are received in the FDC for attack, they must be analyzed quickly and the best or most effective method of attack determined. This is a part of the tactical fire direction process. Target analysis to the field artillery battalion FDO is the examination of a target to determine its significance to the maneuver force, based on guidance established by the supported maneuver commander, and to determine the capability and suitability of battalion cannons and ammunition to attack the target.

Detailed nonnuclear target analysis procedures are in FM 6-20; FM 6-141-1, *Field Artillery Target Analysis;* and in Joint Munitions Effectiveness Manuals (JMEM) indexed in DA Pam 310-3, *Index of Doctrinal, Training, and Organizational Publications.*

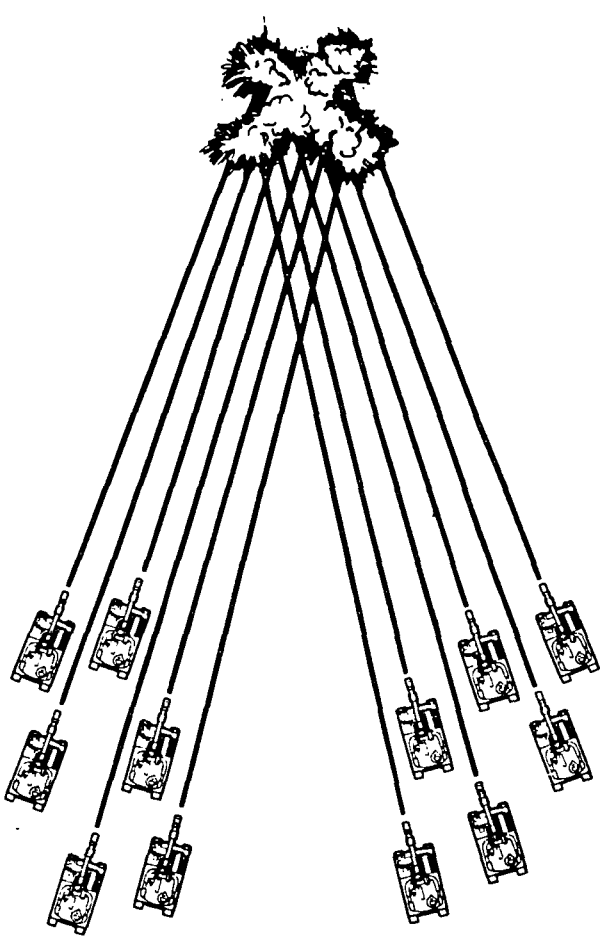
CONSIDERATIONS FOR PROCESSING FIRE MISSIONS

- **The target. Tanks and exposed infantry require different shell/fuze combinations and ammunition expenditures. High explosive (HE), variable time (VT) may kill exposed troops, but it will not stop a tank.**
- **The target priority. During peak firing periods, some targets will not be fired on because there are not enough guns/ammunition to go around. The decision to attack is based upon the maneuver commander's assessment of which targets are most critical to the operation.**
- **Target location. Some targets may be very close to friendly troops, which may preclude some types of ammunition from being fired.**
- **Accuracy of target location. It may not be possible to locate a target with sufficient accuracy to do any more than suppress a general area. The maneuver commander must know this if he expects the target to be neutralized or destroyed.**
- **Terrain in the target area. An example of terrain influence is the degrading effects forests have on VT-fuzed projectiles and improved conventional munitions (ICM).**
- **Effect required. The right shell/fuze combination must be selected and the number of rounds needed to destroy, neutralize, or suppress a target must be determined.**
- **Ammunition available. During peak firing periods or rapid movements, ammunition may be available for only the most critical targets.**

Massing fires. The preferred engagement method for many targets is surprise massed fires because the enemy cannot react and seek protection before he is hit.

METHODS OF MASSING FIRES

- **Batteries receive target location and fire when ready. Using this procedure, rounds may impact in the target area for several minutes, allowing the enemy time to react.**



- **Batteries fire in a battalion time on target. Using this procedure, all rounds arrive in the target area simultaneously, eliminating reaction time for the enemy. This method is particularly lethal against lightly protected troops, but it requires accurate target location, common survey within the battalion, valid firing data corrections, and battalion command control of the mission.**

- **Batteries receive target location, report to battalion FDC when ready, and fire at the command of the battalion FDO. For this method to be effective, firing unit times of flight must be about the same, and the batteries must be able to talk to battalion. This method requires minimal coordination, is fast, and can be as effective as a time on target (TOT).**

Optimum target and shell/fuze combination matrix. How to engage targets effectively with respect to shell/fuze combinations and volleys of fire has long been an FDO dilemma. Currently, we have the Joint Munitions Effectiveness Manuals for the various caliber weapons as well as Graphical Munitions Effects Tables (GMET) to assist us in this area. However, these items will not always be responsive to the needs of the next battlefield when engaging targets of opportunity. It is difficult to consider rapidly all munitions effects data. Recommended volume of fire based on the JMEM or GMET data must also be tempered by ammunition availability.

An approach to this problem is the optimum shell/fuze combination and target matrix *(figs 1-1, 1-2, and 1-3)*. This matrix, based on data derived from JMEM, does not give percentages of effects but rather, in priority, optimum shell/fuze combinations to use against both personnel and materiel targets. This matrix also gives area coverage for a battery one round and battalion one round to further enhance the FDO's ability to select a suitable shell/fuze combination and volume of fire. With the area coverages listed, it may also be an indication to the FDO of when to mass fire.

PERSONNEL TARGETS

Numbers listed do not indicate recommended number of rounds.

TARGET TYPE	SIZE (m)	HE/PD	HE/tl	HE/VT	HE/CP	WP/PD	** HC/tl	ICM/AP	ICM/DP
SQUAD/SMALL PATROL/SMALL UNIT HQ	50	5th	4th	3d	*	5th	*	2d	1st
PLATOON/ COMPANY	150-250	5th	4th	3d	*	5th	*	2d	1st
BATTALION	250-500	*	4th	3d	*	*	*	2d	1st
OBSERVATION/ COMMAND POST	50	5th	4th	3d	6th	5th	*	2d	1st

Figure 1-1.

* Shell/fuze combination is not appropriate for target type to produce a significant number of casualties.

** With maneuver approval, HC/ti can be used in conjunction with HE or ICM to increase enemy command control problems and consequently may indirectly increase effect of HE or ICM on any personnel target type.

Notes.
1. All targets are considered in open terrain as opposed to wooded or marshy terrain.
2. If the target area is wooded, the use of HE/VT may achieve an excessively high airburst.
3. If the target area is marshy, effects of HE/PD are greatly reduced.
4. Optimum shell/fuze combinations are listed in descending order.
5. For all personnel-type targets, one-half are considered standing and one-half are prone on the first volley of FFE and all personnel are considered prone on subsequent volleys. If the personnel are crouching in foxholes, then ICM/DP will have very little effect.
6. HE/CP is considered only when the type target would be expected to have overhead cover.

MATERIEL TARGETS

TARGET TYPE	SIZE (m)	HE/PD	HE/ti	HE/VT	HE/CP	WP/PD	** HC/ti	ICM/AP	ICM/DP	REMARKS
T-55 TANK/ APC	50-250	2d	4th	3d	*	5th	*	*	1st	Converged sheaf increases percentage of damage.
MG BUNKER	50	2d	5th	4th	1st	*	*	*	3d	Converged sheaf significantly increases percentage of damage. Target considered to have overhead cover.
AAA RADAR VAN	50	4th	3d	2d	*	5th	*	*	1st	Converged sheaf significantly more effective. HE/VT approx 3% more effective than HE/PD.
Z1L157 MEDIUM TRUCK	50-250	2d	4th	3d	6th	5th	*	*	1st	HE/PD approx 2% more effective than HE/VT.
FROG	50	2d	3d	2d	5th	4th	*	*	1st	Percentage of damage for PD and VT virtually same. Converged sheaf significantly increases damage.
FROG— TACTICAL	50	2d	4th	3d	6th	5th	*	*	1st	HE/PD approx 3% more effective than HE/VT.
140-mm ROCKET AND LAUNCHER	125	2d	4th	3d	5th	6th	*	*	1st	Damage relatively insignificant until an excessive number of rounds fired unless ICM/DP is used.
152-mm GUN/ HOWITZER	125	2d	4th	3d	5th	6th	*	*	1st	See note 3 below.

Figure 1-2.

Notes. 1. Notes 1-3 from figure 1-1 apply.
2. FDO must be familiar with type equipment so that other materiel targets can be equated to those listed.
3. Converged sheaf recommended. If CEP in TLE is 50 meters, virtually no damage to equipment until the number of rounds is excessive; however, damage could be achieved on personnel with the equipment.

† EXPECTED AREA OF COVERAGE (m)			EXPECTED FRACTION OF CASUALTIES
ICM	SQUARE	CIRCLE (RADIUS)	RT = 50
BTRY ①	266 × 266	150	.15
BN ①	390 × 390	220	.35

HE	SQUARE	CIRCLE (RADIUS)	PD	VT
BTRY ①	275 × 275	155	.03	.05
BN ①	390 × 390	220	.11	.16

Figure 1-3.

† This does not consider density of coverage.

Note. Expected fraction of damage for materiel targets will be .03 or less for a bn ① except for trucks. Expected fraction of damage for trucks will be slightly less than that for personnel.

ACRONYMS FOR TABLES

(HC/ti)
hexachloroethane (smoke)/time

(HE/CP)
high explosive/concrete piercing

(HE/PD)
high explosive/point detonating

(HE/ti)
high explosive/time

(HE/VT)
high explosive/variable time

(ICM/AP)
improved conventional munitions/ antipersonnel

(ICM/DP)
improved conventional munitions/dual purpose

(RT)
radius of target

(TLE)
target location error

(WP/PD)
white phosphorus/point detonating

A good FDO trains for his job *before* combat. When the battle starts, there will not be time to ponder voluminous tables or charts. Responsive fires require FDOs capable of making sound, instantaneous decisions in an environment of rapidly changing situations.

Field artillery fire planning.

Field artillery fires are planned to achieve one of three effects on the target: suppression, neutralization, or destruction. The desired effect will be determined by the supported unit commander, the fire support coordinator (FSCOORD), or the fire direction officer.

Suppression. Suppression of a target limits the ability of the enemy personnel in the target area. Firing HE/VT creates apprehension or surprise and causes tanks to stay buttoned up, reducing their combat effectiveness. Smoke is used to blind or confuse enemy gunners, observers, and leaders. The effect of suppressive fires usually lasts only as long as the fires are continued. This type fire is used against likely, suspect, or inaccurately located enemy firing positions and normally requires a low expenditure of ammunition.

Neutralization. Neutralization of a target knocks the target out of the battle temporarily. As a general rule, 10 percent or more casualties will neutralize a unit. The unit will become effective again when the casualties are replaced and damage is repaired. Neutralization fires are delivered against targets located by accurate map inspection, by indirect fire adjustment, or by a target acquisition device. The assets required to neutralize a target vary according to the type and size of the target and the weapon-ammunition combination used.

Destruction. Destruction puts the target out of action permanently. Thirty percent or more casualties or materiel damage, inflicted during a short time period, normally renders a unit permanently ineffective, depending on the type and discipline of the enemy force. Direct hits are required to destroy hard materiel targets. Targets must be located by accurate map inspection, by indirect fire adjustment, or by a target acquisition device. The assets required vary. However, destruction usually requires large expenditures of ammunition from many units. Destruction of armored or dug-in targets with field artillery is not economical.

Field artillery fire planning at maneuver brigade level is the responsibility of the direct support field artillery battalion. The S3, S2, FISTs, FSOs, battery FDCs, and battalion ops/FDC section are all involved in field artillery fire planning. Initial guidance for planning field artillery fires is received in the force commander's concept of the operation, which includes the scheme of maneuver and the general plan of fire support. Fire planning begins then and is a continuous process that takes place concurrently at all levels of command.

The focal point for field artillery fire planning at maneuver brigade level is the direct support field artillery battalion ops/FDC. Under the battalion commander's direction, the S3 plans field artillery fires in support of the maneuver commander's concept of operation. He receives targets from the maneuver battalion FSOs, the brigade FSO, the

division artillery TOC, adjacent field artillery units, and his own S2 and attached target acquisition means. These targets are plotted and any duplications are resolved. Targets that the DS battalion cannot adequately engage are forwarded to the division artillery TOC or a reinforcing unit, if available. Appropriate FSOs and FDCs are notified of changes made. The S3 determines in what schedule or schedules each target will be placed and issues a fire order stating when and how the target will be attacked and what type and quantity of ammunition will be expended on the target.

As the targets are received in the battalion ops/FDC, the operations section records the target on the target list worksheet. After the S3 decides in what schedules the target will be included, the operations section places the target on a scheduling worksheet. When the targets are scheduled and the documents prepared, the S3 issues his field artillery support plan to organic, attached, and reinforcing field artillery units. This may be in the form of a complete field artillery support plan, frag orders, or oral orders to executing units, depending on the time available. The field artillery support plan is prepared by the DS field artillery battalion ops/FDC and issued to the executing field artillery units.

When a field artillery support plan is prepared, it will contain, as a minimum, three elements: the basic document, target list, and appropriate schedules.

1

The *basic document* provides necessary guidance for receiving units to implement the plan and other special information on the employment of field artillery fires in support of the operations. This information may be transmitted face to face or by radio on net calls.

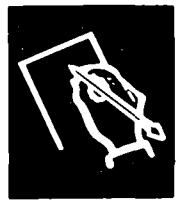
2

The *target list* contains all the information required for the attack of targets included in the plan. It is extracted from the target list worksheet and may be transmitted by voice, message, or messenger separately and in segments depending on time available.

3

The *schedules* are included to assign firing units to each target in each schedule and tell them in what order, with what type and amount of ammunition, and at what time to attack each target. FM 6-20, appendix I, has detailed procedures on the preparation of the field artillery support plan.

Plans and orders.



Command control of the field artillery cannon battalion is established through the assignment of tactical missions. From these missions, the battalion commander derives specific fire support responsibilities to the supported maneuver force.

Field artillery cannon battalion missions. Field artillery tactical missions describe in detail the fire support responsibilities of a field artillery

unit and establish the fire support relationship with a maneuver unit or another field artillery unit; they *do not* affect the organizational structure and the command relationships that result from that structure. Field artillery tactical missions are assigned by the force commander on the advice of the force artillery commander, who is the fire support coordinator for the force.

Each field artillery tactical mission answers the following seven basic questions concerning field artillery support responsibilities:

- **From whom and in what priority does the unit answer calls for fire?**
- **What is the zone of fire of the unit?**
- **Who furnishes FIST or FSO?**
- **With whom does the unit establish liaison?**
- **With whom does the unit establish communications?**
- **Who positions the unit?**
- **Who plans the fires of the unit?**

Field artillery cannon battalions best meet their fire support responsibilities most of the time through one of four basic tactical missions, referred to as *direct support, reinforcing, general support reinforcing,* and *general support.* Each mission specifies the particular way of meeting each of the seven responsibilities described above. These responsibilities in each of the tactical missions are discussed below and are summarized in *figure 1-4.*

Direct support. A cannon battalion operating in direct support of a maneuver unit is primarily concerned with the field artillery support needs of only that unit. The direct support cannon battalion commander is the fire support coordinator for the supported maneuver force, normally a maneuver brigade. Fires are planned and coordinated with the maneuver unit, and the battalion is positioned where it can best support the scheme of maneuver. If the cannon battalion cannot provide the support required for a planned scheme of maneuver, it is the responsibility of the FSCOORD to make this known to the supported maneuver commander. The same cannon battalion should habitually support the same maneuver force in order to provide for good teamwork.

Each direct support battalion trains and deploys fire support sections and FISTs. It sends one fire support section to the designated maneuver brigade, one to each of the brigade's battalions, and a FIST to each of the brigade's maneuver companies. After initial deployment, fire support sections and FISTs will remain with the maneuver unit throughout the conflict.

Fire support sections and FISTs to support the divisional cavalry squadrons will be trained and deployed by divisional general support battalions (headquarters and headquarters battery (HHB) of division artillery for airborne divisions).

The responsibility for immediate replacements for casualty losses to fire support section and FIST personnel and equipment rests with the field artillery battalion with the DS mission. Similarly, supply and maintenance support should be specified in terms of what the supported unit will provide and what the parent battalion will provide.

RESPONSIBILITIES OF FIELD ARTILLERY TACTICAL MISSIONS

An FA unit with a mission of—	Direct Support	Reinforcing	General Support Reinforcing	General Support
1. Answers calls for fire in priority from—	1. Supported unit 2. Own observers* 3. Force FA HQ	1. Reinforced FA 2. Own observers* 3. Force FA HQ	1. Force FA HQ 2. Reinforced unit 3. Own observers*	1. Force FA HQ 2. Own observers*
2. Has as its zone of fire—	Zone of action of supported unit	Zone of fire of reinforced FA	Zone of action of supported unit to include zone of fire of reinforced FA unit	Zone of action of supported unit
3. Furnishes FIST/FSO**—	Provides temporary replacements of casualty losses as required.	No requirement	No requirement	No requirement
4. Furnishes liaison officer	No requirement	LO to reinforced FA unit HQ	LO to reinforced FA unit HQ	No requirement
5. Establishes communications with—	FIST chiefs, FSOs, and supported maneuver unit HQ	Reinforced FA unit HQ	Reinforced FA unit HQ	No requirement
6. Is positioned by—	DS FA unit commander or as ordered by force FA HQ	Reinforced FA unit or as ordered by force FA HQ	Force FA HQ or reinforced FA unit if approved by force FA HQ	Force FA HQ
7. Has its fires planned by—	Develops own fire plans	Reinforced FA unit HQ	Force FA HQ	Force FA HQ

Figure 1-4.

* Includes all target acquisiton means not deployed with supported unit (radar, aerial observer, survey parties, etc.)

** A fire support section (FSO tm) for each maneuver brigade and battalion/cavalry squadron and a fire support team for each maneuver company/ground cavalry troop are trained and deployed by the FA unit authorized these assets by table of organization and equipment. After deployment, FISTs and FSO teams will remain with the supported maneuver unit throughout the conflict.

Reinforcing. Cannon battalions reinforce other cannon battalions that *support* maneuver forces. When a cannon battalion requires augmentation of its fires to meet the field artillery support needs of a maneuver force, the reinforcing mission may be assigned to another cannon battalion to meet that need. A cannon battalion can *reinforce* only one other cannon battalion, but a reinforced cannon battalion can *be reinforced by* more than one cannon battalion. The reinforcing mission allows a force artillery commander to increase the field artillery support of a subordinate cannon unit without attachment.

General support reinforcing. The GSR mission requires the cannon battalion to furnish artillery fires for the force as a whole *and* to reinforce the fires of another cannon battalion as a second priority. A GSR battalion remains under the control of the force artillery headquarters, which has priority of fires. However, a quick-fire channel is established for immediate response to the reinforced battalion's need for additional fires. The GSR mission offers the force commander flexibility to meet the requirements of a variety of tactical situations.

General support. A cannon battalion assigned the mission of GS provides field artillery support for the force as a whole and remains under the immediate control of the force artillery headquarters. The GS mission provides cannon artillery immediately responsive to the needs of the force commander. The GS mission is the most centralized of the tactical missions.

Nonstandard missions. In tactical situations where the commander's intent cannot be accurately conveyed with one of the standard field artillery tactical missions, a nonstandard mission may be assigned. Nonstandard missions amplify, limit, or change one or more of the seven mission responsibilities or spell out contingencies not covered by the seven responsibilities. Examples of nonstandard missions are:

EXAMPLE 1

1st Bn (155, SP), 40th FA: General support reinforcing 1st Bn, 42d FA (not to exceed 30 percent of controlled supply rate in reinforcing 1st Bn, 42d FA). With this nonstandard mission, the battalion will still meet all the responsibilities of the general support reinforcing mission. It will not, however, expend more than 30 percent of its controlled supply rate (CSR) in answering calls for fire from the 1st Bn, 42d FA. This revision of a GSR tactical mission insures availability of a certain amount of ammunition for future operations.

EXAMPLE 2

2d Bn (155, SP), 64th FA: Reinforce 2d Bn, 61st FA (force artillery headquarters retains positioning authority for 2d Bn, 64th FA). This nonstandard mission changes one of the responsibilities of a reinforcing mission.

EXAMPLE 3

1st Bn (8, SP), 43d FA: General support; answer calls for fire from 1st Sqdn, 23d Cav, in priority after force artillery headquarters. This nonstandard mission does not basically affect the unit's tactical mission of general support; it simply affords a degree of responsiveness from this battalion to a nearby maneuver element that needs fire support. Implementation of this revision would probably require no more than agreement on a communications channel.

If the revision of a mission is so complex that the standard field artillery tactical mission is no longer recognizable, a nonstandard mission statement will be issued that specifically addresses each of the seven responsibilities or other areas not covered by the seven responsibilities.

Issuing orders. Before a battle, there may be time to consider in detail what must be done to support the maneuver force and prepare written plans and orders. During battle, however, the battalion commander may have only a few hours or minutes to plan before executing a tactical mission. He will probably issue most of his plans and orders verbally using notes—based on the five-paragraph field order format described in FM 101-5, *Staff Operations*. When possible, the commander should give his orders on the terrain to be occupied. Warning orders about new or changed missions should be given as soon as possible. Timely warning orders facilitate future operations by alerting units and giving them time to prepare for mission changes. They are usually brief oral or written messages.

Operation orders can alert units to anticipate changes. For example:

1-40 FA (155, SP): GSR
1-41 FA (155, SP): on order, DS 1st Bde.

This tells the 1st Bn, 40th FA, commander that when the 1st Bde is committed, he is in direct support of the brigade. He can prepare for this mission by establishing communications with the 1st Bde and participating in brigade battle planning.

When the operation begins, orders are oral and brief. Most often they are mission changes or instructions to move. If the staff and batteries are familiar with the commander's operational concept and the original order, brief orders are sufficient.

The troop leading process. The use of troop leading procedures allows available time to be used efficiently for preparation to respond to changing missions. The process is not rigid. Cannon battalion commanders modify it to fit the mission, situation, and available time. All the steps, however, should be covered, even if each takes only a few seconds. Some steps are taken concurrently; some go on continuously throughout the mission.

THE TROOP LEADING STEPS

A. Receive the mission.
B. Issue the warning order.
C. Make a tentative plan to accomplish the mission.
D. Initiate the necessary movement sequence.
E. Reconnoiter.
F. Complete the plan.
G. Issue orders.
H. Supervise and refine.

A **Receive the mission.** Leaders may receive a mission in either an oral or written operation order or a fragmentary order. Upon receipt of an order, the leader analyzes his mission to be certain he understands what is to be done and plans the use of available time. Often the most critical resource when a cannon battalion receives a new mission is time, especially daylight hours. The commander must not waste time that can be used by subordinate commanders for reconnaissance and planning of their own. A reasonable rule of thumb is: use no more than one-third the available time for planning by the battalion headquarters and leave two-thirds for the commanders and leaders of subordinate units.

B **Issue the warning order.** A leader gives a warning order immediately after receipt of a warning order from higher headquarters. He does this by telling his subordinates the mission, the time it starts, and the time and place for issuance of the complete order. This permits better use of time available to plan and prepare. A warning order is usually issued orally.

C **Make a tentative plan.** The commander should make a tentative plan of how he intends to accomplish the mission. When the mission is complex and time is available, he may make a fairly formal mental estimate, following the procedures outlined in FM 101-5.

When the mission is uncomplicated or time is short, he will make this mental estimate very quickly. The commander knows his own situation, knows as much about the enemy as he can under the specific circumstances, knows the mission and what it requires, and applies all of this to the terrain in the assigned area. The tentative plan he develops is the basis for coordination, unit movement, reallocation of resources, if any, and reconnaissance.

The cannon battalion mission will usually be stated in specific terms as to *who, what, when,* and *where.* The *how* is left to the commander to decide. He must apply the fundamentals so that he optimizes the capabilities of his organic, attached, and supporting systems; minimizes their vulnerabilities; and accomplishes the mission. His tentative plan is a direct, simple expression of *how.*

D **Initiate necessary movement.** The battalion commander will have many important matters on his

mind at this point. Often the driving consideration is the absolute necessity to make good use of the available time so that subordinate commanders and the battalion staff can reconnoiter, move, prepare, and fit their units and weapons to the ground.

If the battalion must move a considerable distance, it should be set in motion immediately based on the first rough concept. This permits advance parties and surveyors to get on the ground early. Then the commander needs to get out on the ground and see for himself how to best employ the combat power of his battalion. The commander must have a smooth system, a standing operating procedure, to permit all these actions to proceed simultaneously so that no time is wasted.

Brief oral orders must generate instant movement by every element of the battalion. When the commander is called to receive an order, he should take with him some other person of authority who can return to the unit to issue a follow-on warning order, prepare the unit, and, if necessary, move it. This person can be the executive officer or S3. With these activities under control, the commander can make his reconnaissance, confirm or modify his tentative plan, and prepare to issue his final order while the battalion is moving to its new position.

E **Reconnoiter.** To make best use of his forces and fires, the commander must see the assigned terrain. There will be times when he can make only a map reconnaissance. But if any time at all is available and if the commander has the first four steps in hand, he *must* get out on the terrain. It is during this reconnaissance that the commander confirms his tentative plan or modifies it to magnify every advantage of his weapons and afford maximum survivability for his troops. He will usually want some assistants with him to save time and to add their skills to his.

F **Complete the plan.** As a result of the reconnaissance, the commander may not alter his tentative plan, but he certainly will add detail. He will refine his concept and plan for fire support and will focus upon specific tasks for all units, insuring that all fit together simply and effectively.

G **Issue orders.** Most orders are issued orally, sometimes from a handwritten five-paragraph field order outline and a sketch or overlay. If the battalion commander has made a reconnaissance, he will usually issue orders from a vantage point in the assigned area. This permits him to point out particular terrain features on the ground as well as on the map and eliminates time that might be spent in driving back to a command post to speak to subordinates who would then drive forward to reconnoiter. The commander may issue overlays with his order, but more often he will have only his own map available with control measures sketched on it. He then requires subordinate commanders to copy this information on their own maps. If the entire

battalion is moving or is already involved in an operation, he may issue orders over the radio or by messenger, or he may meet each commander in turn to instruct him face to face, while the unit continues its activity. The commander should make absolutely clear his concept for the operation from beginning to end; that is, how he sees the battle being fought and what he expects from each subordinate leader. The commander should also prescribe what actions his subordinate leaders should take under foreseeable situations in the event the commander is out of communication for some reason.

Supervise and refine. The commander and his staff must supervise to insure that all necessary preparations for conduct of the operation are being made. These include coordination with the supported force and higher headquarters, allocation of resources, survivability considerations, and any other required actions. When the operation is underway, the commander must insure that the plan is followed and must issue fragmentary orders to modify or refine the operation as the situation develops. The requirement to supervise is continuous and as important as issuing orders.

Positioning.

The term "battalion (battery) position" is defined as that area occupied, or to be occupied, by the battalion (battery) with its elements disposed to provide fire support. Position areas designated in orders, on maps, or on overlays do not constitute a rigid restrictive area for the batteries. They should be considered only as guides to be followed as closely as the mission, terrain, and tactical situation permit. The planning for the selection of any position must include consideration of communication requirements and combat service support.

Position classification. A *primary* position is a position from which the battery intends to accomplish its tactical

mission. Plans should be made to organize and improve the primary position, although the tactical situation may require displacement at any time.

An *alternate* position is a position to which the battery moves when the primary position becomes untenable or unsuitable for carrying out the assigned task. The alternate position must meet all the requirements of the primary position so the battery can continue to fulfill its original task. The alternate position must be far enough away to prevent its being rendered untenable by the same action that affects the primary position. At least one alternate position should be selected and prepared (consistent with time constraints) for each primary position.

A *supplementary* position is a temporary position to which the elements of the firing battery may move to accomplish a specific mission, such as to attack targets that cannot be fired on from the primary or alternate position or to deceive the enemy as to the location of the primary position. Supplementary positions may be occupied to conduct offset registrations, adjust with a roving gun, fire on targets beyond the range of the primary position, conduct nuclear missions, and defend the battery against ground attack.

Factors affecting the selection of position areas.

Mission. The battalion must be able to accomplish its assigned mission from the position. Position priority goes to nuclear-capable units first, then to DS and reinforcing units, then to GSR and GS units.

Tactical situation. The supported force's mission and plans will influence the location of the position and the way it is improved. (Chapters 2 and 3 discuss the selection of positions during offensive, defensive, and covering force operations.)

Communication. The position areas must facilitate communication, particularly with FIST, the supported or reinforced unit, and force artillery headquarters. The position should also provide a measure of electronic security for radios and radars.

Defilade. Defilade is protection from enemy observation and direct fire weapons by use of a terrain mask. The position area should be located in defilade but not so close to the mask that low-angle fire capabilities are restricted.

Defensibility. The position areas selected should facilitate both active and passive defense. The area selected should—

- **Be able to be entered without enemy observation.**
- **Offer effective cover and concealment.**
- **Avoid high-speed approaches into the position from the forward edge of the battle area (FEBA) or potential breakthrough area.**
- **Have more than one entrance and exit route.**
- **Have enough space to disperse equipment and facilities.**

FM 6-50, *The Field Artillery Cannon Battery,* discusses the defense of battery positions in detail. The special security requirements for nuclear weapons are discussed in FM 100-50, *Nuclear Unit Operations in Combat.*

Trafficability. The soil within and between positions must be firm enough to support battalion weapons and ammunition vehicles.

Weather. Current and anticipated weather conditions and the effect of weather on the terrain will influence the selection of positions; e.g., a low area that can be occupied when dry may become a swamp during or after a rain.

Enemy counterfire capabilities. The commander must consider the enemy counterfire capabilities when selecting positions. If the counterfire threat is large, the importance of defilade, concealment, electronic security, hardening of positions, and dispersed routes increases.

Effect on future operations. The position must enable the battalion to support later phases of the battle or facilitate rapid movement to another position to support the next phase.

The S3 must know the types of positions a battery may occupy and the factors affecting selection of position areas. It is the S3 who designates the general area for each subordinate element, and he must use this knowledge to provide an area that accounts for these considerations. For example, if the space provided a battery is not large enough to sustain an alternate position, the battery is in a vulnerable position. Another example may be when the S3 needs to place batteries in forward supplemental positions to engage targets beyond the range of the primary position.

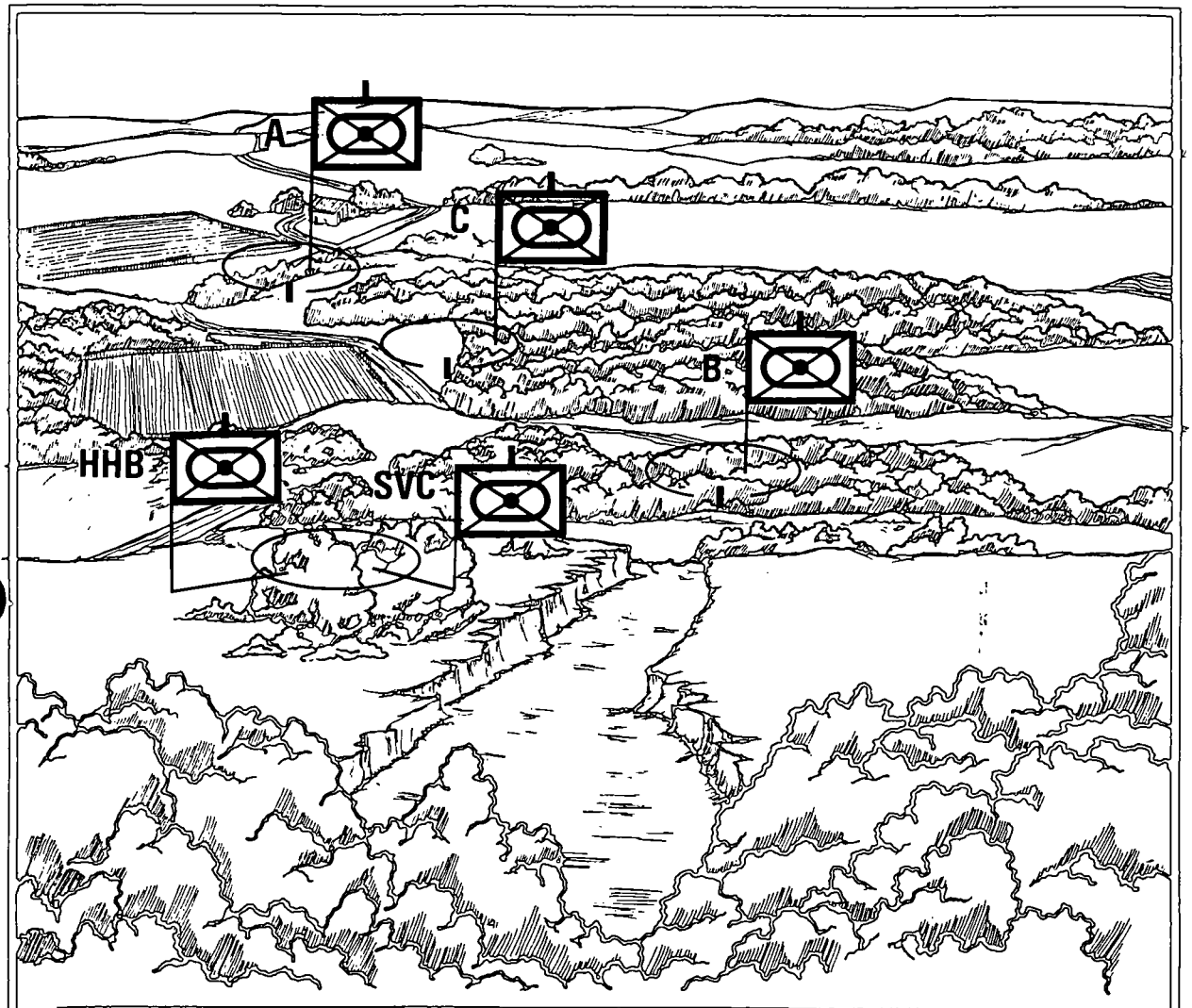
Methods of positioning cannon artillery units. In combat there are two general methods of deploying field artillery units in position areas:

- **Position each firing battery in a separate location, with the headquarters and service batteries positioned together or in separate locations.**
- **Position each firing battery in a separate location. Establish a separate TOC area. Establish a unit trains or, when applicable, establish separate combat and field trains areas.**

In each method, firing elements have positioning priority, and preparation time required to carry out the mission is minimized.

This illustration shows separate cannon battery position areas. The headquarters and service batteries are either collocated or in separate position areas. Normally, a battalion would use this method of positioning in a situation that does not require frequent moves by either the headquarters or service batteries.

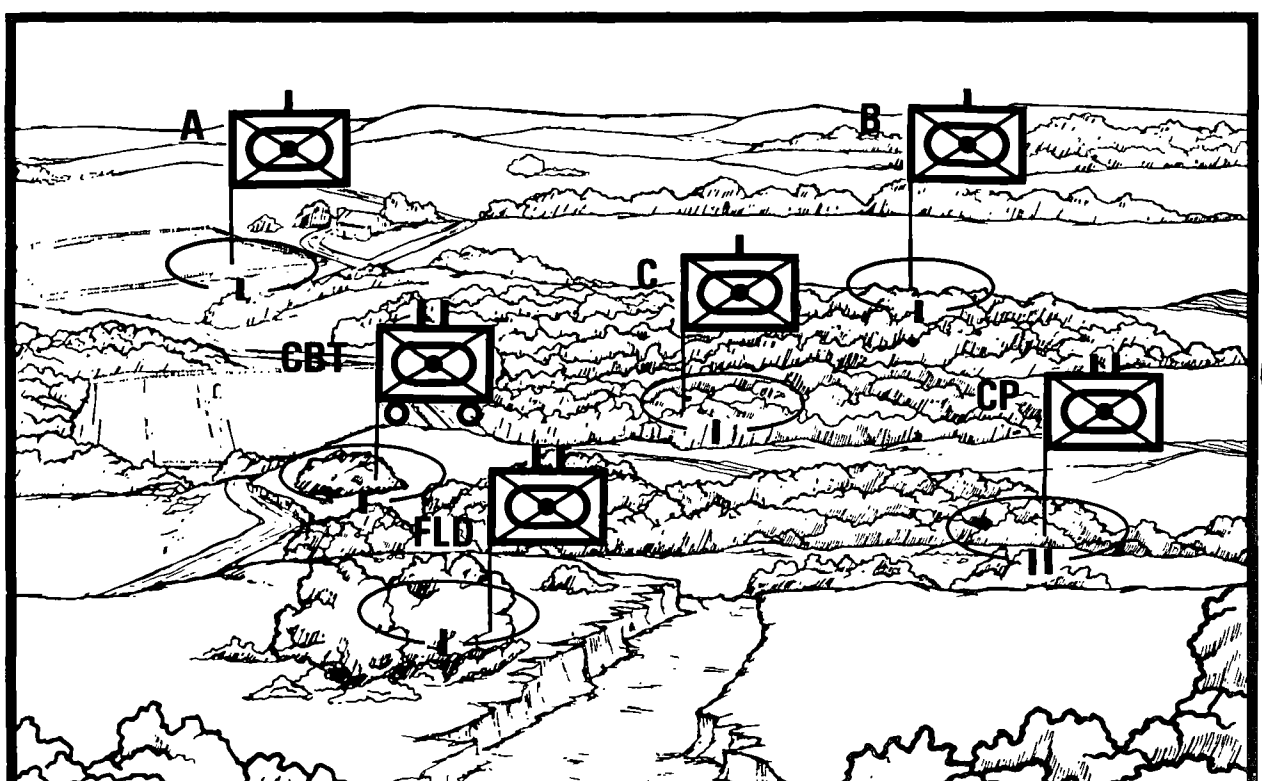
SEPARATE CANNON BATTERY POSITION AREAS



ADVANTAGES	DISADVANTAGES
High degree of passive defense against nuclear attack. Enemy action against one element of the battalion should not require displacement of the entire battalion. Enemy detection of the entire battalion is more difficult.	The combined HHB, svc btry position makes this position easy to detect and hard to move. Command, administration, and local security are more complex. Lack of suitable position areas, time, and routes may prevent use of this method.

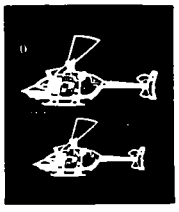
This illustration shows separate cannon battery position areas, a separate command post area, a combat trains area, and a field trains area. The battalion command post (CP) should be located in proximity to the brigade CP and close enough to command control the firing batteries. Normally, a battalion would use this method of positioning in a situation that requires frequent moves by the command element. Chapter 5 discusses combat service support, the employment of unit trains, combat trains, and field trains.

SEPARATE TRAINS (FLD, CBT), CP, AND CANNON BATTERIES



ADVANTAGES	DISADVANTAGES
Actions taken by an enemy against one element will not necessarily affect other elements.	Coordination for service support is more complicated.
Facilitates support of maneuver operations.	Local security for the command control element is poor.
The commander's flexibility is greater.	Command, administration, and local security are more complex.

Reconnaissance.



Reconnaissance is performed to select the best battalion and battery positions, march routes, start and release points, command posts, observation posts, and communication sites, and to analyze the terrain where the battle will be fought. Prior to or concurrent with reconnaissance, the field artillery commander/S3 should coordinate with the maneuver commander/S3 to determine what areas maneuver units plan to occupy. Mutual agreement must be established to make the best use of the available terrain.

Types of reconnaissance. There are three ways to reconnoiter—from a *map,* from the *air,* or on the *ground.* The best reconnaissance is done by combining all three techniques.

1

Map reconaissance is simply studying and analyzing a map to get a terrain appreciation and to determine where to go and how to get there. This should be the first step in any reconnaissance. Position areas and routes can be selected from a map, and this may be the only option available to the commander and staff. There are dangers, however, in reconnoitering only from a map.

- **Actual terrain conditions cannot be determined.**
- **Roads, towns, and terrain features may have changed.**
- **Other units may be in the positions.**
- **There may be enemy forces in the area.**

2

Air reconnaissance is a quick way to perform reconnaissance over large areas. It is an especially useful method to check routes and get a general indication of the terrain and position area availability. However, it is difficult to get a true picture of terrain conditions unless the reconnaissance party lands in or near the new position. The flight plan must not compromise routes or positions. A good indication to an enemy of where units will be located is an aircraft circling over unoccupied terrain. The result can be that the battalion is hit with a heavy artillery barrage as it occupies a position.

3

Ground reconnaissance is the best method for checking routes and selecting positions. The terrain can be walked on, driven on, and looked at from different directions. Communication sites, position entrances and exits, cover, concealment, defilade, and trafficability can all be checked. However, too much activity may reveal to the enemy where the battalion plans to go next.

Reconnaissance planning begins as a result of the commander's initiative, based on his knowledge of the battle, or as a result of a change in orders. In either case, the commander and his staff coordinate with the supported maneuver force to insure neither is competing for the same terrain.

The commander should take only the people and equipment necessary to help him formulate plans, issue orders, and select and prepare positions. It is normal for the S2, S3, communications-electronics staff officer (CESO),

reconnaissance and survey officer, and battery commanders to accompany the battalion commander. Composition of a reconnaissance party (orders group) is generally prescribed in the unit standing operating procedures. FM 6-50, chapter 3, further depicts firing battery reconnaissance parties and techniques.

One way to reconnoiter:

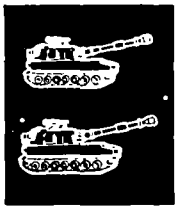
- The battalion commander or S3 warns the staff and battery commanders before the unit must displace.
- The battalion commander provides the battalion executive officer the information necessary to expedite the occupation of the new position.

For example:

- **The order for displacement of headquarters and service battery elements.**
- **Probable routes, start points, release points, time of movement, and route marker use.**
- **Probable order of march.**

- The battalion commander then assembles his reconnaissance party. He points out, on the ground or on a map, the general location for the position areas and the tentative general locations for each installation. If the commander plans to make a personal reconnaissance, a time and place where his order will be issued must be designated. If he assigns tasks to members of his party, he designates the time and place for party reassembly. Fires should be planned along any march routes and around the positions to be reconnoitered.

Displacement.



Field artillery battalions must frequently displace to provide continuous fire support to maneuver units.

A ***direct support*** cannon battalion displaces when necessary in order to support the operation or when ordered to by the force artillery commander. The battalion commander coordinates battalion movement with the supported unit to determine when best to move, where to move, and when the battalion must again be ready to fire.

A ***reinforcing*** battalion displaces when ordered to by the reinforced artillery unit or the force field artillery headquarters. The reinforcing unit tells the reinforced headquarters how the unit will move, when movement starts, when movement is completed, and where the new positions are located.

A ***general support reinforcing*** battalion displaces when ordered by the force artillery headquarters or as requested by the reinforced field artillery unit, subject to the force artillery commander's approval. A GSR battalion commander may also recommend new position areas, routes, and displacement times to the force field artillery commander.

A ***general support*** battalion displaces when ordered by the force artillery

headquarters. The battalion commander continually studies the situation and may recommend new position areas, routes, and displacement times to the force field artillery commander.

The displacement method used depends on time available, scheme of maneuver of the supported unit, availability of reinforcing field artillery, traffic conditions, and enemy activity. There are three ways to displace.

In ***unit displacement,*** the battalion displaces with all elements moving at once. This method should be used when other artillery units can provide adequate support during the movement. Unit displacement is the fastest way to move the battalion. However, the battalion cannot support while moving. If it becomes necessary to fire after displacement has started, the battalion, or some of its batteries, must conduct an emergency occupation. Emergency occupations are described in FM 6-50.

When the battalion displaces ***by echelon,*** one or two firing batteries and some headquarters and service elements move in one echelon, while the remainder of the battalion remains in position. When the first echelon is in position and ready to fire, the second echelon displaces.

When displacing ***by battery,*** the battalion can better provide continuous support than when displacing by echelon or as a unit. Also, this technique makes the unit less vulnerable to attack and makes it more difficult for the enemy to detect movement. However, more time is required to move the battalion.

To provide uninterrupted fire support, planning for displacement is continuous.

DISPLACEMENT CONSIDERATIONS

- **The method of displacement used by a cannon battalion depends on the time available, the scheme of maneuver of the supported unit, the availability of reinforcing field artillery, traffic conditions, and enemy activity.**
- **When the battalion displaces by echelon or by battery, the operations/FDC complex also displaces by echelon to insure that the battalion is capable of delivering fires at any time. Continuous communication is maintained with the supported unit, with the reinforcing field artillery, with higher field artillery headquarters, and between the battalion echelons.**
- **When time is available, it is desirable to have fifth-order survey in the firing position. Directional control may be brought into the battery areas by means of traverse, astronomic observation, or other artillery survey techniques.**
- **When two or more field artillery battalions displace over the same route, the force artillery commander coordinates the movement.**
- **When field artillery units must displace over a route used by units of other arms, the force commander coordinates the movements.**
- **Except in operations involving nuclear employment, direct support field artillery units have priority on routes over all other artillery.**
- **When nuclear weapons are present in displacing units, security must be provided in accordance with FM 100-50.**

Displacement procedures will vary from unit to unit. However, they should be

described in the unit's standing operating procedures.

For example:

- **Identify personnel, equipment, and vehicles for the "jump" element.**
- **Identify communication nets to be used.**
- **Identify specific duties for key personnel.**

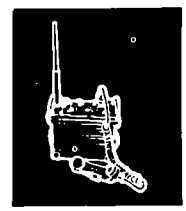
The displacement of the operations/FDC section is a particularly critical move. The overriding consideration during displacement is the need to maintain a capability for continuous operations. The operations/FDC is authorized sufficient personnel to man two shifts. Normally, this will form the basis for the breakout of personnel during displacement operations, one shift moving with the jump element and the other remaining at the current location until the jump element is in position and operational.

Procedures will vary from unit to unit based on personnel and equipment available, the tactical situation, and the displacement distance. These detailed displacement procedures should be spelled out in the unit's tactical SOP and, as a minimum, should include:

DISPLACEMENT PROCEDURES

- **Personnel, equipment, and vehicles to be displaced with the jump element.**
- **Personnel, equipment, and vehicles to remain operational at the old location until the jump element is in position and operational.**
- **Communication nets to be used during displacement.**
- **Specific duties of key personnel during displacement.**

Communications.

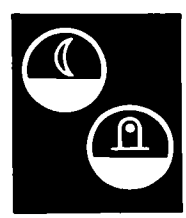


The cannon battalion commander must rely on communications to control elements of his command, gather information, distribute intelligence, and coordinate fire support. The primary means of communication in the cannon battalion are radio and wire.

Typical single channel radio nets in cannon battalions are illustrated in appendix C. The heavy reliance on FM radio makes artillery battalions especially susceptible to enemy electronic detection and jamming.

The size of the battalion wire system depends on the length of time a position is occupied. Generally, the wire system duplicates the installed radio nets used by the battalion. When installed, wire becomes the primary means of communication, with single channel radio used as an immediate backup system. For details on the field artillery cannon battalion communications, see Appendix C, Communications.

Combat service support.



Combat service support (CSS) is the process of keeping the maximum number of weapon systems operational.

COMBAT SERVICE SUPPORT PROVIDES:

- Ammunition
- POL
- Maintenance
- Vehicle recovery
- Supply
- Administration
- Food service
- Medical support

(Each of these areas is covered in detail in chapter 5.)

The support functions and operations in the battalion by the S1, S4, or any other supervisor must be closely coordinated with tactical operations. A continuous exchange of information among CSS coordinators, the S3, and battery commanders is essential to the success of both tactical and logistical plans.

The process is continuous, characterized by a sense of urgency, and always done in the context of the mission at hand and the commander's concept for accomplishing it.

An important management tool is a clear and concise SOP that reflects general and routine aspects of combat service support operations. Recurring procedures, responsibilties, and reports should be stated and briefly explained. Information regularly received from supporting or supported units should be highlighted. An effective SOP will eliminate the need for lengthy or complicated orders or instructions during operations.

A lengthy, detailed SOP is often ignored and may inhibit the flexibility necessary for innovative and resourceful solutions to situations encountered on the battlefield.

Frequent visits to all elements of the battalion, particularly by the executive officer, will determine if instructions and orders are properly executed. The visits also provide an opportunity to insure the firing batteries are getting *what* they need *when* they need it. By closely supervising the implementation of combat service support plans, the staff officer not only determines how policies are carried out, he also determines what changes to the existing plan are needed.

SURVIVABILITY.

In order to support, the cannon battalion may have to survive enemy ground, air, and artillery attacks. Positions are selected to enhance survivability and provide continuous support to the maneuver force.

Position areas should provide for:

- **Early warning.**
- **Observation.**
- **Fields of fire.**
- **All-round defense.**
- **Cover.**
- **Concealment.**
- **Natural obstacles to slow enemy movement, if possible.**

Positions should not be situated on major enemy avenues of approach. Positions that can be hardened or fortified rapidly are desirable. The commander should select areas where subordinate units can have at least one alternate position.

Positions should be hardened at every opportunity. If available, engineer equipment can be used to speed up the hardening of positions, create obstacles, and assist in "dummy" position preparation. Cannon battalions request engineer assistance through the supported force.

Security is established using observation posts, listening posts, local patrols, and electronic devices. Advance warning or knowledge about enemy capabilities is vital to establishing a viable battalion and battery defense. It is necessary to aggressively seek this information from fire support elements, maneuver units, command posts, division artillery, and adjacent units. Information on enemy air, ground, and artillery attacks must be passed quickly to subordinate and adjacent units. Units carrying nuclear weapons must insure that field storage locations are secured in accordance with FM 100-50.

Cannon battalions do not have enough soldiers for all-round defense all the time. Plans should be contained in the unit SOP that describe how weapons and soldiers are positioned and shifted to meet an attack from any direction. Dispersion usually minimizes the effects of an enemy attack. There is no absolute rule on how much dispersion is required between units. It depends on what enemy forces are in the area, whether the supported force is on the offense or defense, the enemy air and artillery threat, the nuclear situation, cover, concealment, and—to a large degree—terrain availability.

SURVIVABILITY INVOLVES:

- **Selecting positions**
- **Dispersing units**
- **Establishing security**
- **Passing information**

Planning for survival begins with an analysis of what enemy actions will most degrade the battalion's ability to accomplish its mission. Plans should be developed by considering immediate action status. There are two immediate action status conditions—*"Stay in position"* and *"move to alternate position."*

"Stay in position" refers to staying in position to accomplish the mission. If the incoming fire volume and accuracy are so great that the mission cannot be accomplished, then the position is untenable and the unit must move to fight and survive.

"Move to alternate position" allows the battery commander to move when the battery begins to receive destructive incoming fires. Such a status may be used for a key nuclear delivery unit.

Headquarters batteries and service batteries should have immediate action plans similar to the cannon batteries. The commander will probably assign a high priority to the protection of communications, intelligence, operations, and FDC facilities. Similarly, the commander should assign a high priority to maintenance and ammunition facilities in the battalion trains area.

The battalion commander establishes which status applies to the battalion based upon:

- The force commander's guidance. If the maneuver commander believes the tactical situation requires all available field artillery support for a critical operational phase, the battalion commander would probably designate a "stay in position" status for firing batteries.
- What augmenting field artillery is available. If the battalion has reinforcing or GSR units available, there is less need to assign a "stay in position" status.
- Position-hardening capabilities. If battery equipment can be dug in, the "stay in position" risk is reduced.
- Risk. The FA battalion commander must decide whether it is better to stay in position and shoot or temporarily reduce field artillery support while moving to an alternate position that enhances unit survivability.

Key points

- The cannon battalion supports a maneuver force by suppressing, neutralizing, and destroying the enemy.
- To do that, it must be able to:

- Communicate.
  Move to the right place.
- Furnish the guns with required firing data.
- Meet the specified and implied requirements of the mission.
- Apply the supported commander's guidance in the attack of targets.

CHAPTER 2:

Offense

The primary purpose of offensive operations is to destroy the enemy. Offensive operations may also be conducted to secure key terrain, gain information about enemy strength and dispositions, and occasionally to deceive the enemy. Even though defensive operations are often necessary, offensive action achieves decisive results. The enemy cannot be equally strong everywhere; it is usually possible to concentrate sufficient combat power to outweigh him at a place of the attacking commander's choosing. Even during defensive operations, the commander should never miss an opportunity to attack. This chapter tells the cannon battalion commander and his staff how to support offensive operations. Effective support is based on an understanding of offensive fundamentals, offensive maneuver, and enemy tactics.

Offensive fundamentals.

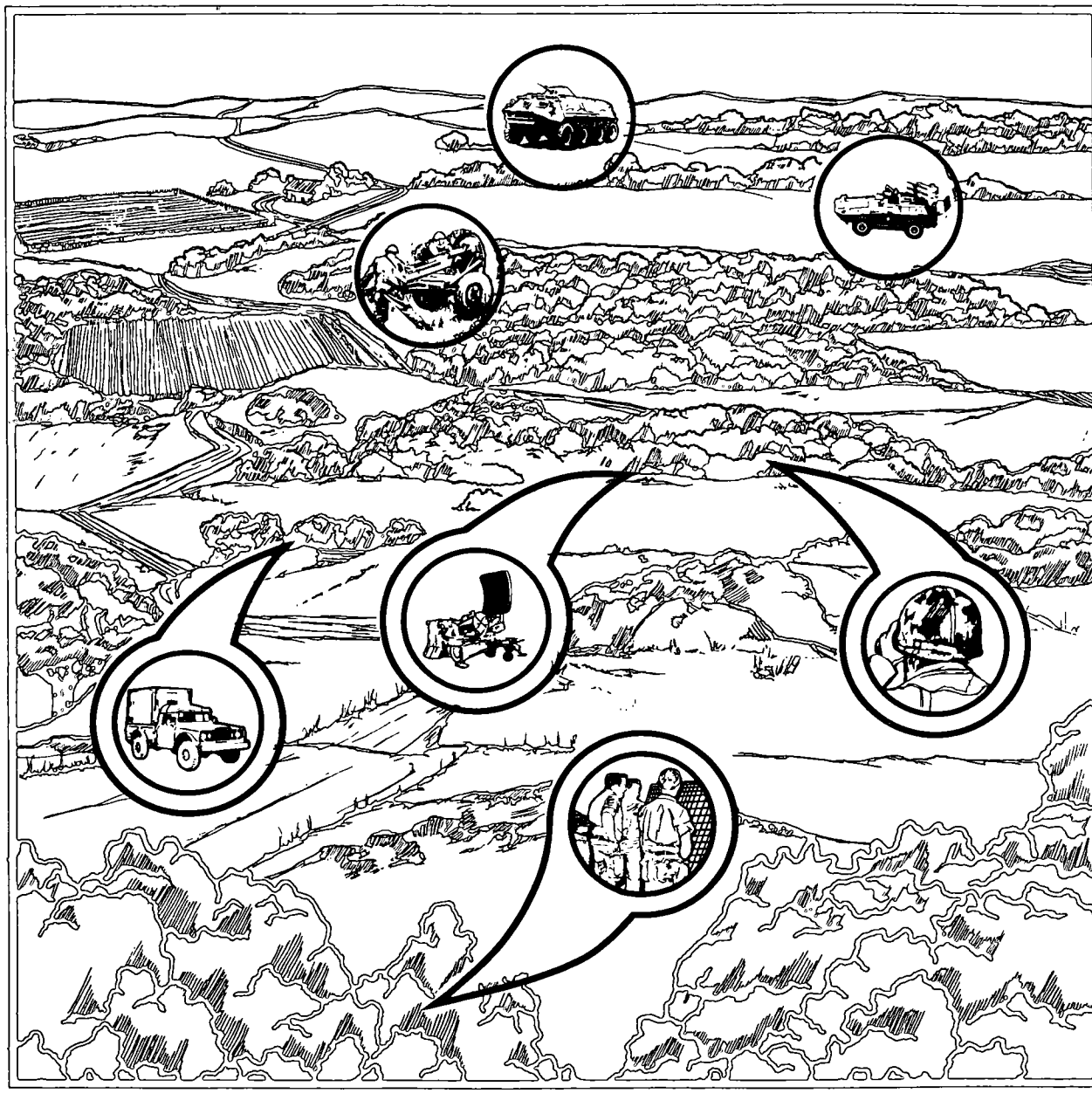
Six fundamentals guide commanders in the conduct of offensive operations. Although the application of each may vary from time to time, they are the same for any offensive operation.

1. **See the battlefield.**
2. **Concentrate overwhelming combat power.**
3. **Suppress enemy defensive fires.**
4. **Shock, overwhelm, and destroy the enemy.**
5. **Attack the enemy rear.**
6. **Provide continuous mobile support.**

See the battlefield. A defender cannot be strong everywhere. To be successful, the attacker must know *where* the enemy is vulnerable. The cannon battalion commander helps the

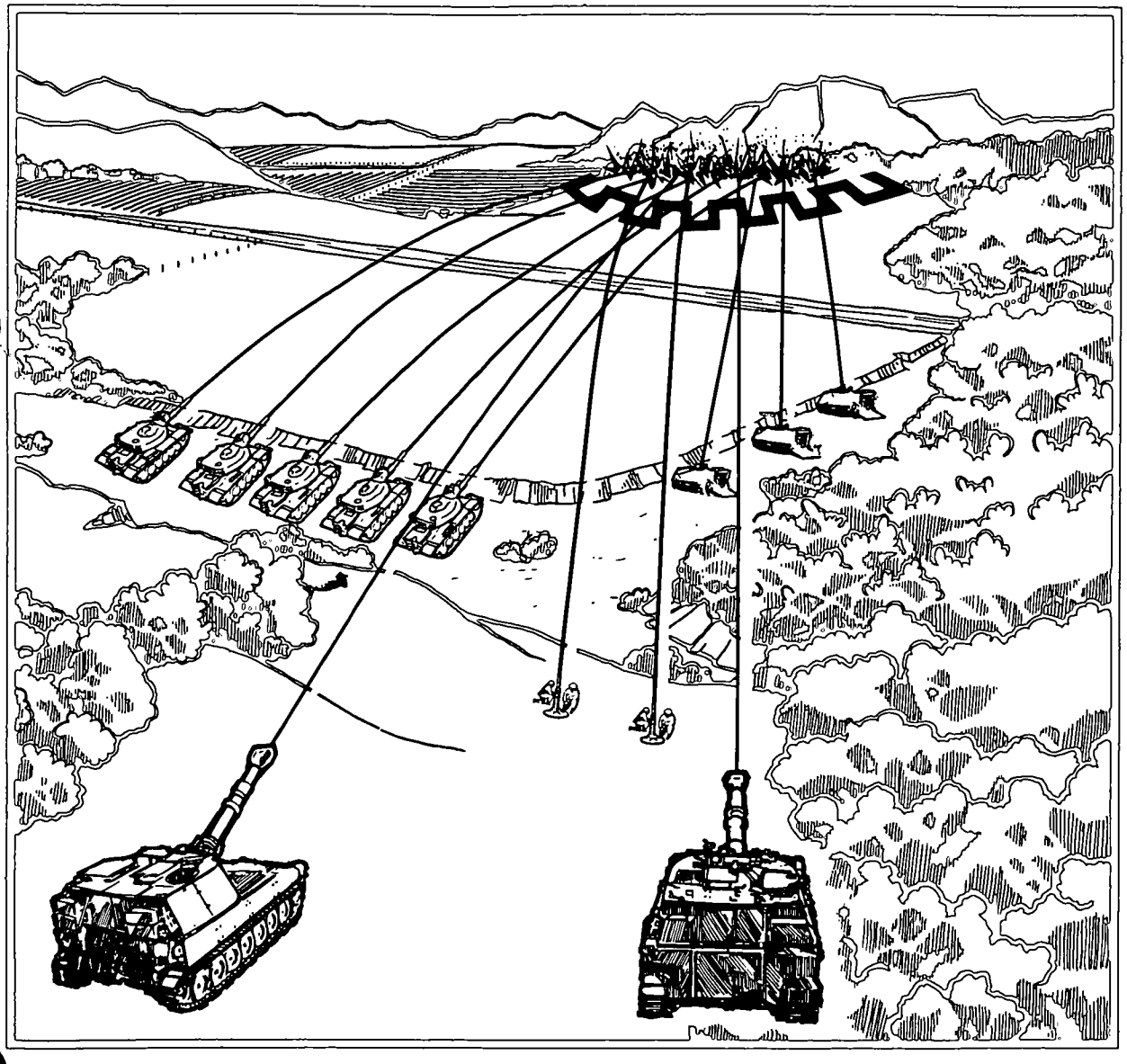
supported commander "see the battlefield" by insuring that target acquisition resources are employed effectively and that the results are interpreted quickly and accurately for target information.

SEE THE BATTLEFIELD



Concentrate overwhelming combat power. While enemy weaknesses may be known from the outset, most attacks begin with a movement to contact, often on a broad front. When contact is made and an area where the enemy is weak or can be weakened is found, it is necessary to concentrate superior forces in that area rapidly. Tanks and mechanized forces are concentrated on a narrow front to break through enemy forward defenses. Field artillery fires are concentrated to protect advancing tank and mechanized forces at the point where the main effort is to penetrate.

CONCENTRATE OVERWHELMING COMBAT POWER

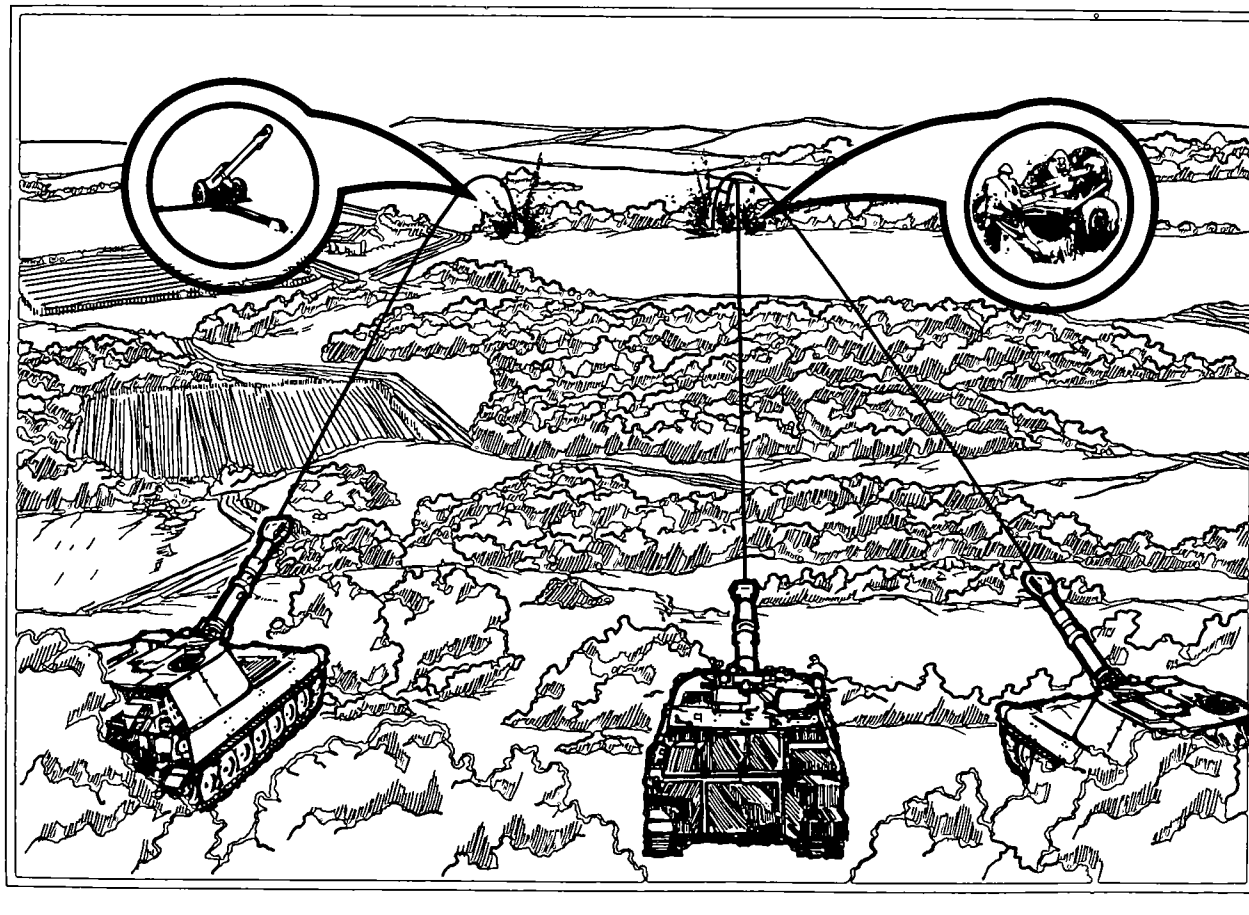


Suppress enemy defensive fires. Concentrated forces are extremely vulnerable to enemy fires; therefore, it is necessary to suppress enemy weapons and to obscure the vision of enemy gunners who can interfere with advancing tanks, mechanized infantry, attack helicopters, and close support aircraft.

Enemy direct fire weapons are suppressed by the attacker's direct and indirect fire weapons. Enemy field artillery, which can also slow or stop an attack and interfere with command post and combat service support operations, must be attacked. Field artillery counterfire, and sometimes US Air Force (USAF) close air support sorties, are concentrated in sufficient numbers and duration to substantially degrade enemy field artillery capable of interfering with the main effort.

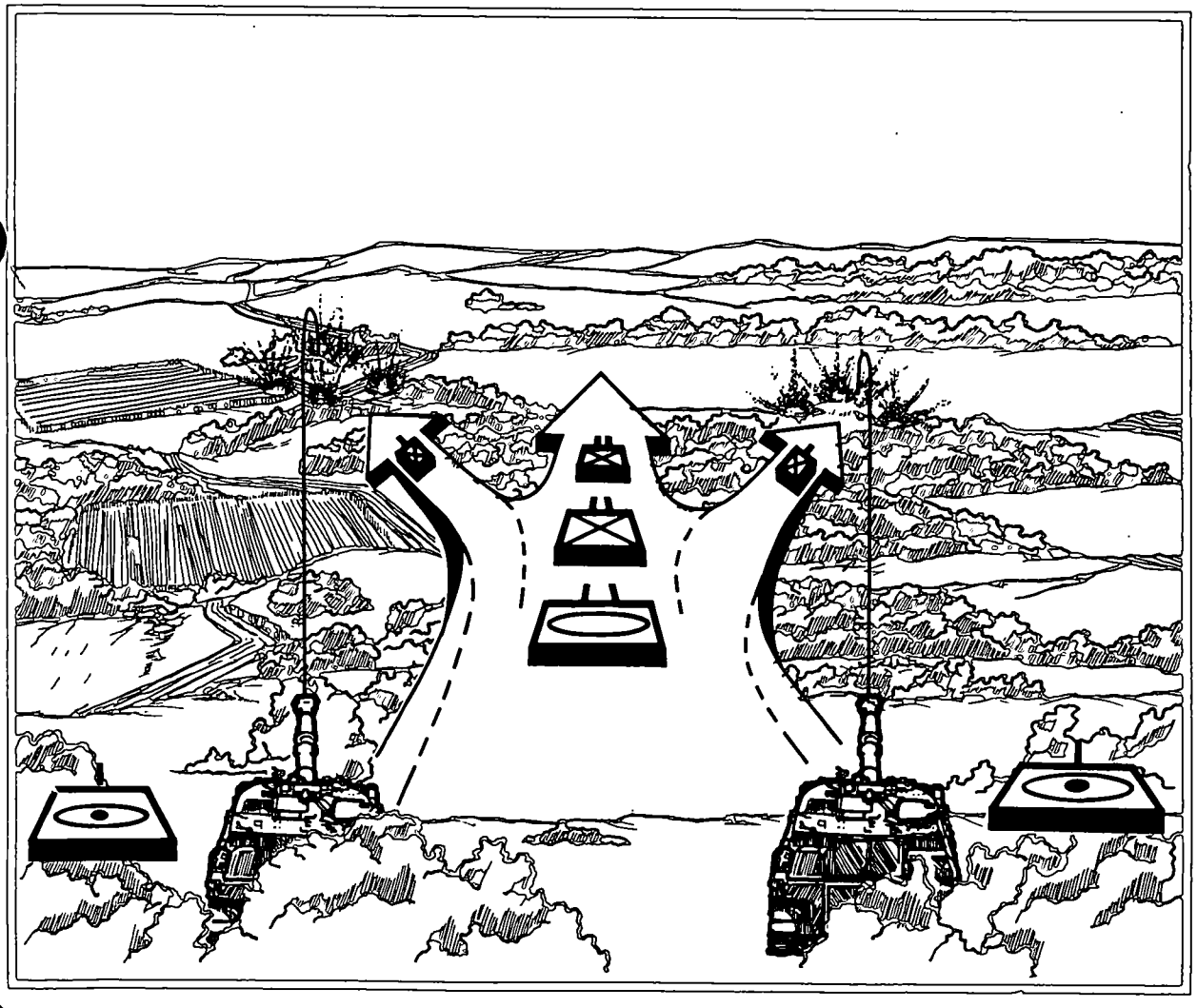
For attack helicopters and USAF aircraft to operate, enemy air defense systems must be suppressed. Electronic support measures and other target acquisition means can be used to locate air defense weapons. Field artillery, and sometimes electronic countermeasures, are employed to suppress or disrupt enemy air defenses.

SUPPRESS ENEMY DEFENSIVE FIRES



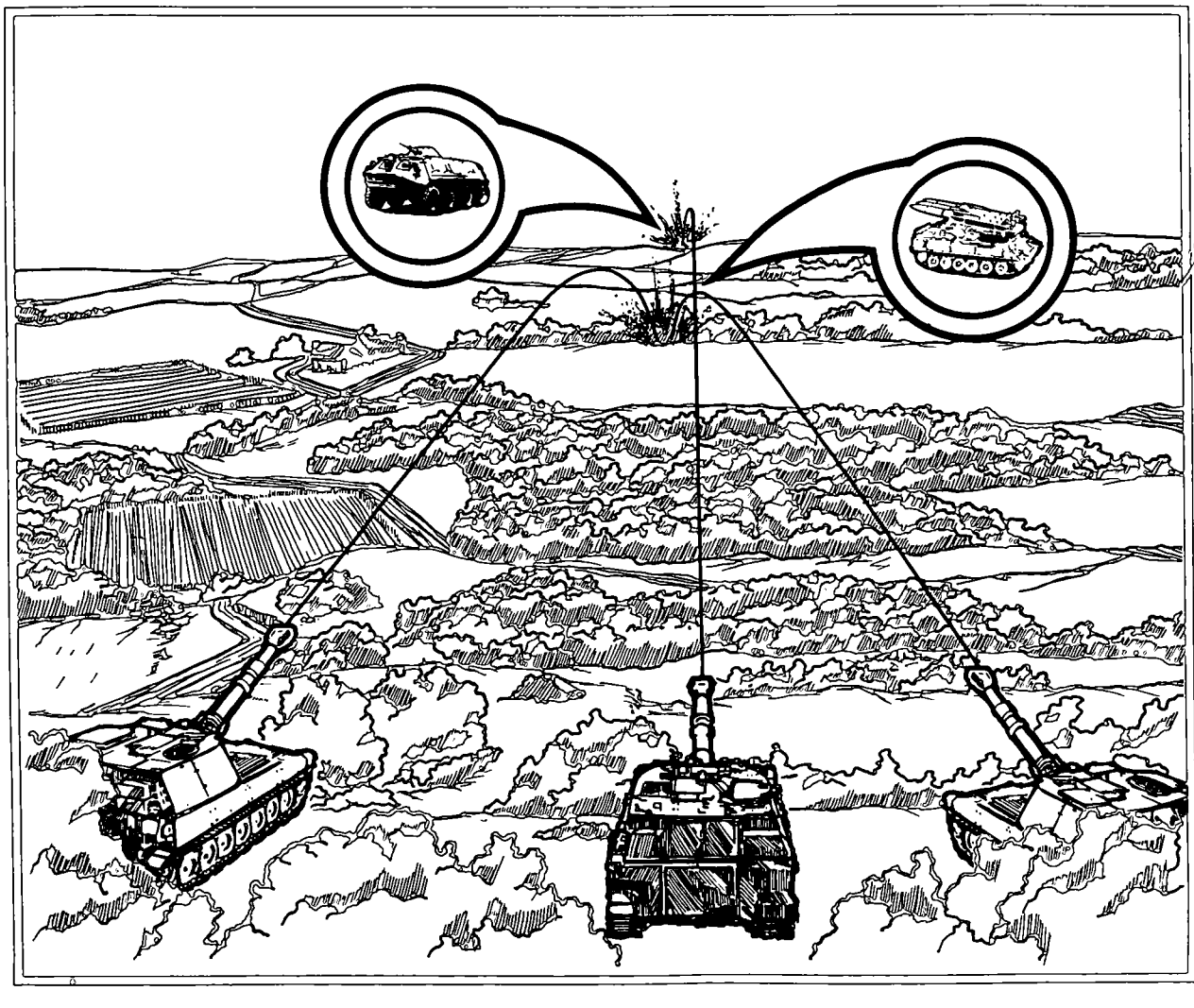
Shock, overwhelm, and destroy the enemy. When an enemy weak point is found or one is created, the attack pushes through with maximum speed, surprise, and violence. Prepared positions are bypassed when possible and cleared only when necessary. Leading battalion task forces that are temporarily stopped must not delay the advance of the division. Attacking units that become stalled or disorganized are bypassed by fresh units. Forces are shifted as necessary to exploit enemy weaknesses as they are revealed. Hasty attacks are conducted to overcome enemy resistance. Deliberate attacks are conducted only when necessary because they take time to plan and organize and are usually costly in execution.

SHOCK, OVERWHELM, AND DESTROY THE ENEMY

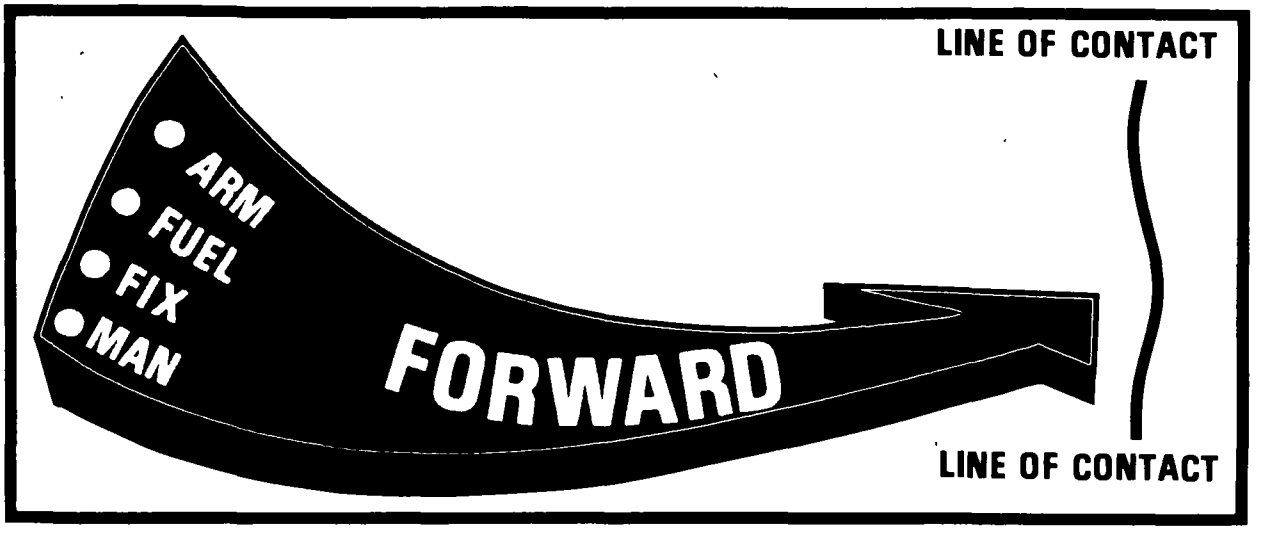


Attack the enemy rear. When enemy forward defenses are penetrated, the attack drives relentlessly toward the enemy rear to destroy field artillery, air defenses, command control, and logistics installations. As the enemy defense begins to give way, success is exploited viciously. Field artillery fires are shifted and massed as necessary to destroy enemy command control, field and air defense artillery, and logistics installations.

ATTACK THE ENEMY REAR



SUPPORT FORWARD



Provide continuous mobile support. For tank and mechanized forces to advance, continuous mobile combat service support is necessary. Field artillery units must carefully plan movement to keep pace with maneuver units. Fuel and ammunition expenditures are apt to be high, but lack of fuel and ammunition must not be allowed to slow or stop the advance. Inoperable combat vehicles must be repaired as far forward as possible and returned to battle quickly. Those that cannot be repaired forward must be immediately replaced.

Enemy defensive tactics.

The enemy defends in two ways—*hasty defense* and *deliberate defense.* For a hasty defense, the enemy uses cover, concealment, and positions that are immediately available. The enemy strengthens a hasty defense if given sufficient time.

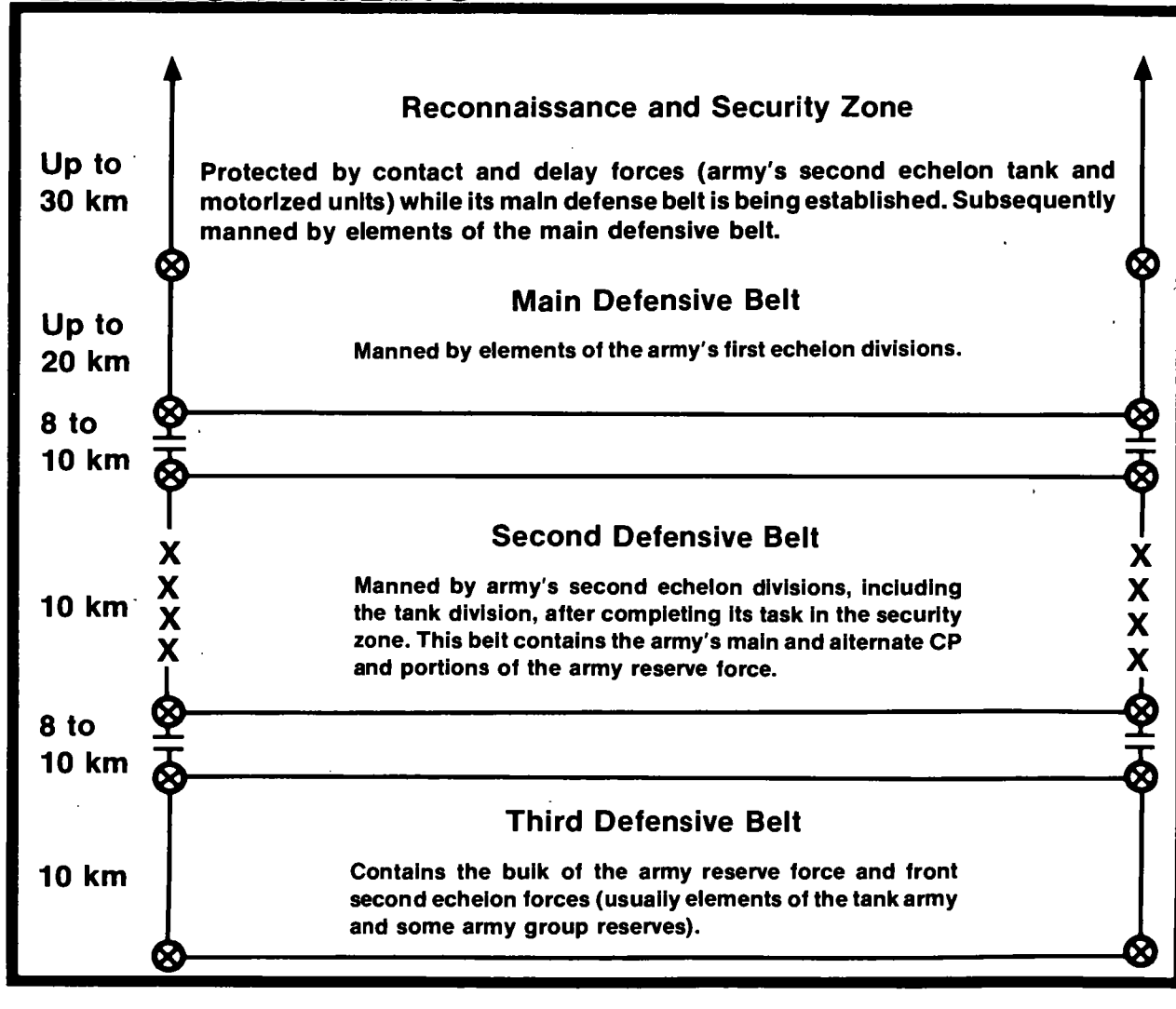
Normally, a deliberate defense is organized into a reconnaissance and security zone and three successive defensive belts. Each defensive belt is a series of mutually supporting, self-sufficient platoon-size and company-size strongpoints echeloned in depth. Strong mobile reserves, normally tank heavy, are retained as a counterattack force. Obstacles are constructed both forward of and within each defensive belt to slow the attacker's advance and to canalize him into fire traps or killing zones.

The reconnaissance and security zone is established to deceive the attacking force and make it deploy before reaching the first defensive belt. This zone may extend from 20 to 30 kilometers beyond the main defensive belt. Normally, it is manned by reconnaissance elements from the division's second echelon and elements from the forward-deployed regiments.

Company and platoon strongpoints are organized in forward positions behind reconnaissance elements. These elements offer stubborn resistance before delaying to prepared positions in the main defensive belt.

The main defensive belt may be 15 to 20 kilometers deep and is the enemy's defense bulwark. This belt is organized around reinforced motorized rifle units. Its purpose is to stop and destroy the attacker by establishing platoon and company strongpoints deployed laterally and in depth and by establishing firetraps where units can be destroyed and counterattacked with tank-heavy reserves.

DEFENSIVE BELTS



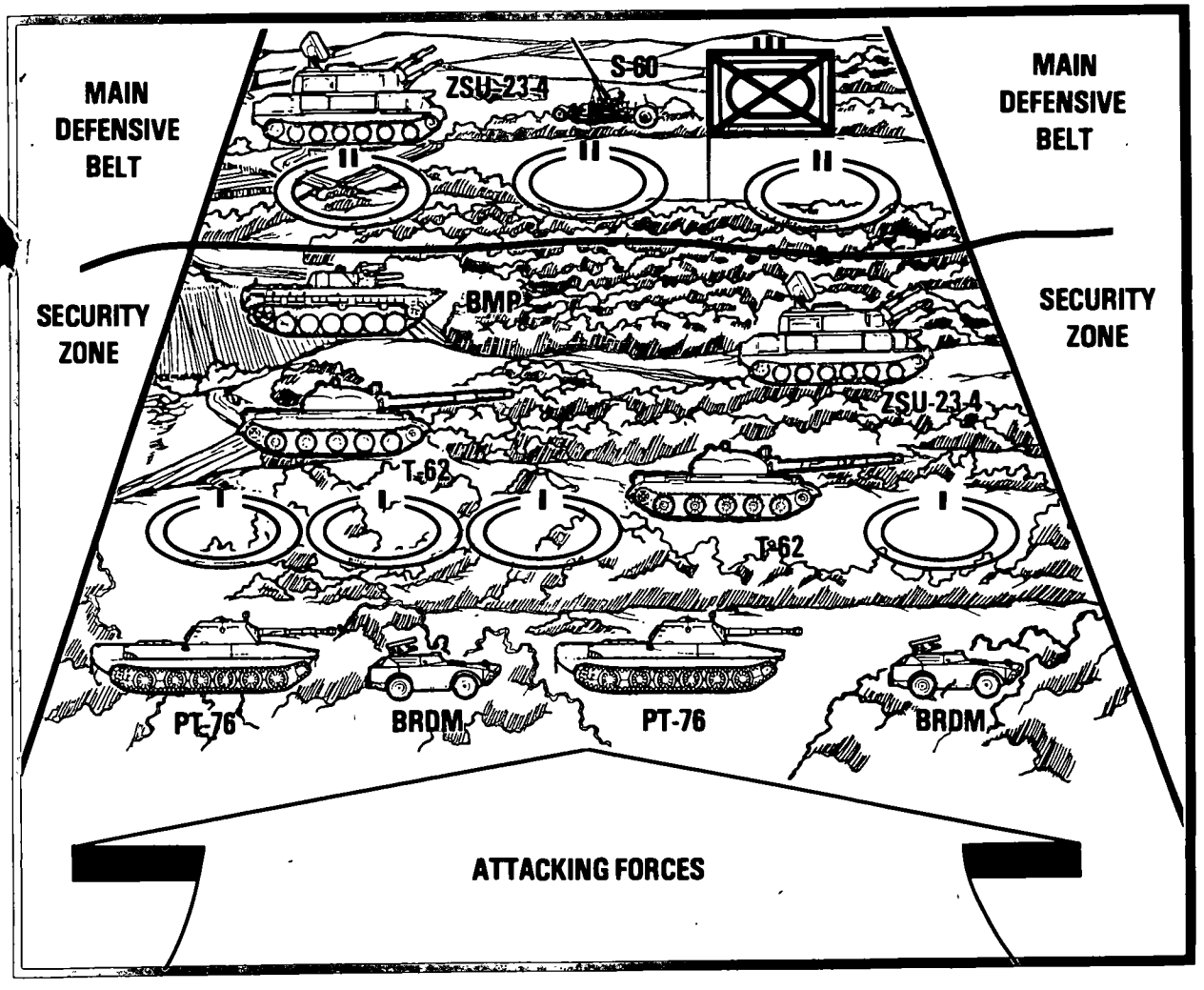
The purpose of the second defensive belt, also organized around reinforced motorized rifle units, is to stop any attacker that penetrates through the main defensive belt.

Tank-heavy forces in the third defensive belt are used to counterattack.

Forms of offensive maneuver.

To understand how the cannon battalion supports offensive operations, it is necessary to understand how maneuver forces conduct offensive operations.

DELIBERATE DEFENSE



The intent of the commander and the best direction of approach to the enemy will dictate the form of maneuver used by an attacker. The commander's intent may vary from time to time but usually can be described in one of four ways:

Attacker's Intentions

1. **Overrun and destroy a weaker enemy in position.**
2. **Fix or hold an enemy force in position.**
3. **Rupture and pass through enemy defenses to secure a deep objective.**
4. **Pass around enemy main defenses to strike him from the flanks and rear causing him to fight in an unexpected direction or perhaps in two directions.**

Enemy positions can be approached from the front, flank, or rear. Two forms of maneuver can be used—envelopment and penetration.

In a single attack, different units at the same level may use different forms of maneuver. In a division attacking to rupture enemy defenses so as to exploit into the enemy rear, one brigade may be required to fix some enemy units in position, while another passes around those positions to destroy them from the flank, and the third is poised to move through the hole created. Within that first brigade, one battalion task force fixes enemy forces while another attacks.

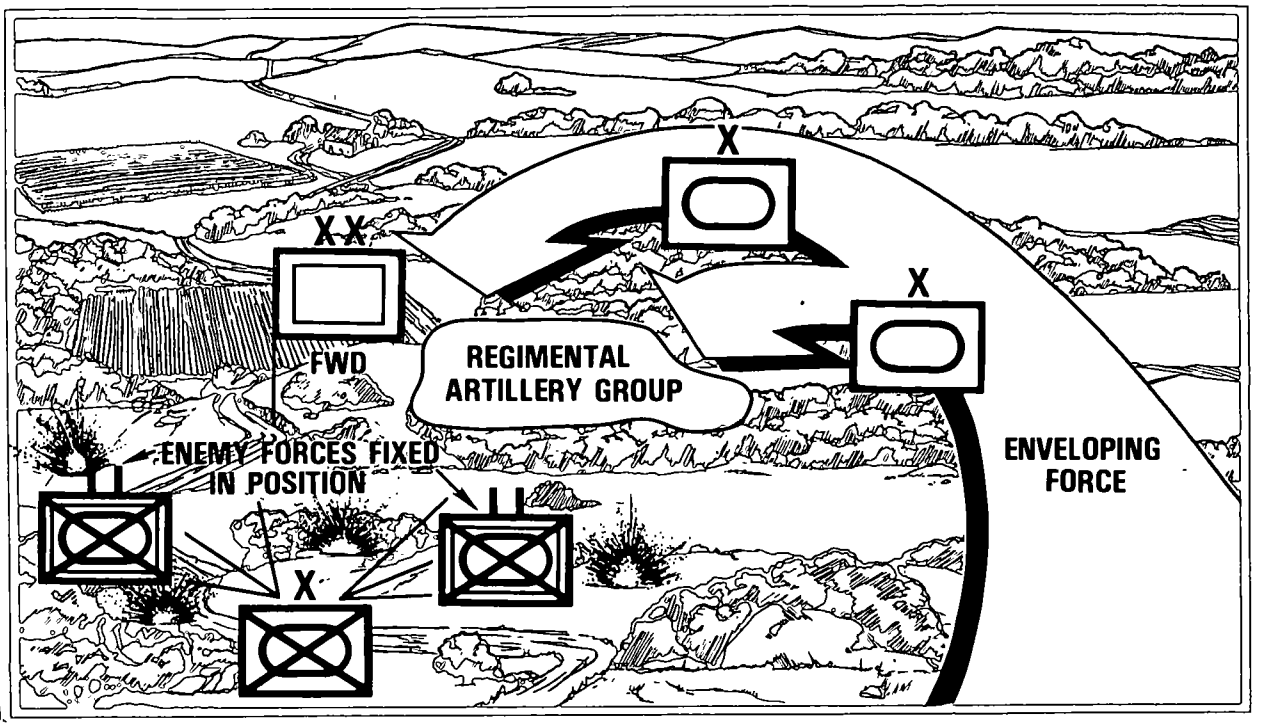
Envelopment. In an envelopment, the attacker passes around enemy strength to strike on a lightly guarded flank or into the rear of the enemy defense. If no open flank or gap in the enemy defense system exists, gaps can be created by fires, fire and maneuver, or a deception operation.

Success often depends on speed and on preventing the enemy from reacting in time with sufficient force to slow the attack. It may be necessary to fix the enemy in place from the front by a supporting attack or by some other means that will delay enemy reaction to the enveloping force. The enemy is then forced to fight in several directions or abandon his positions.

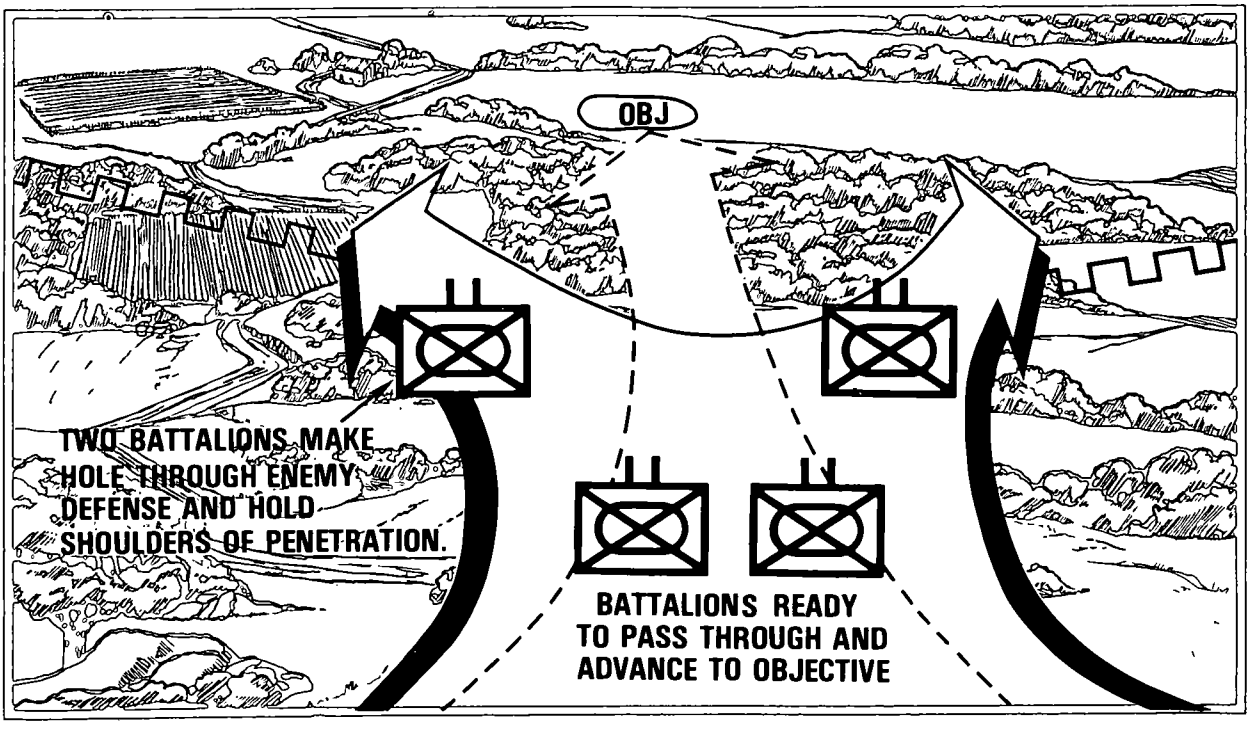
Penetration. In a penetration, the attacker concentrates forces to strike at an enemy weak point, breaks through the position to rupture his defense, holds the shoulders of the gap created, and advances rapidly to the objective.

Successful penetration depends upon the ability of the attacker to suppress enemy weapons, to concentrate forces sufficiently to overwhelm the defender at the point of attack, and to pass sufficient force through the gap to secure the objective quickly. When this is accomplished, the commander has two options. He may continue forward to rupture successive defense lines and ultimately enter enemy rear areas, or he may turn forces to roll up enemy positions from the flanks. The penetration may be preferred when the enemy is overextended or he does not have an exposed flank.

ENVELOPMENT



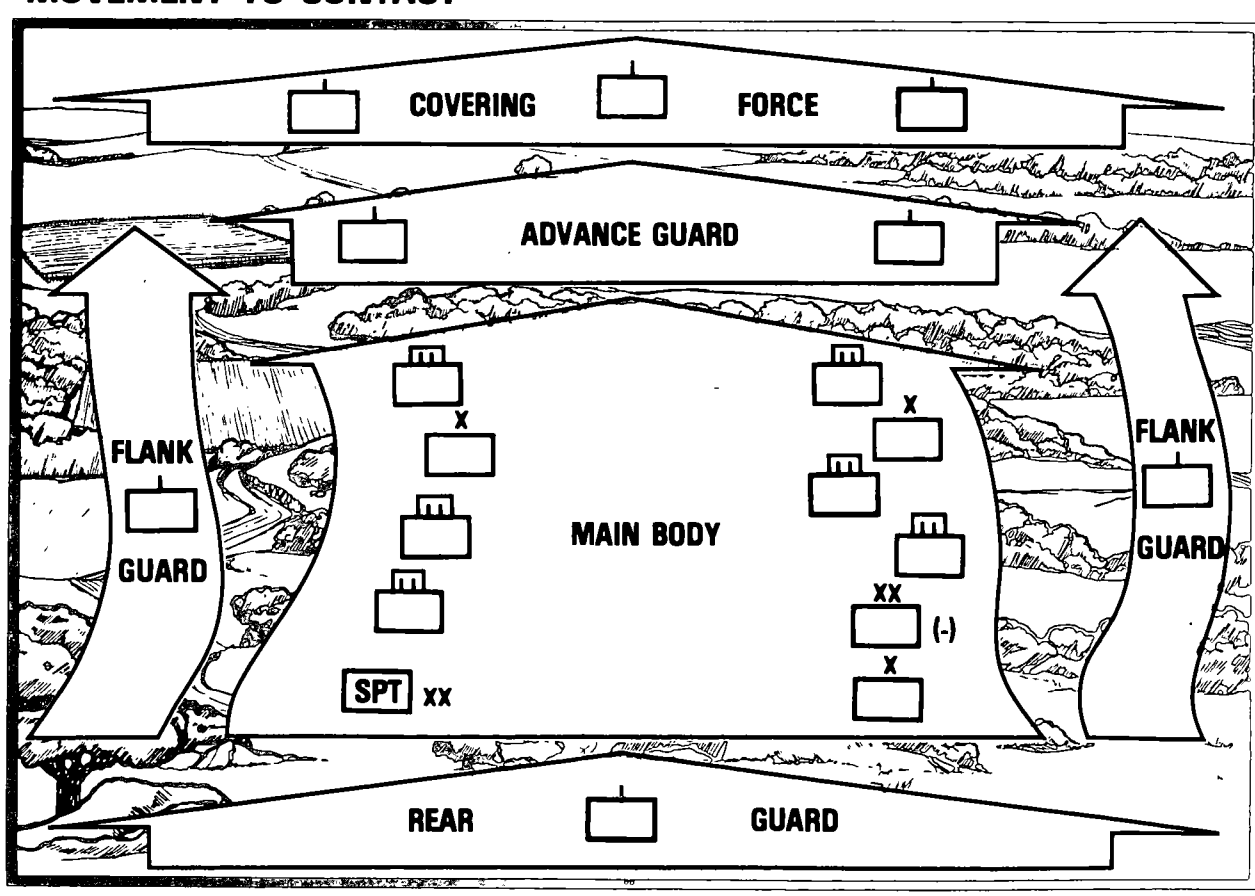
PENETRATION



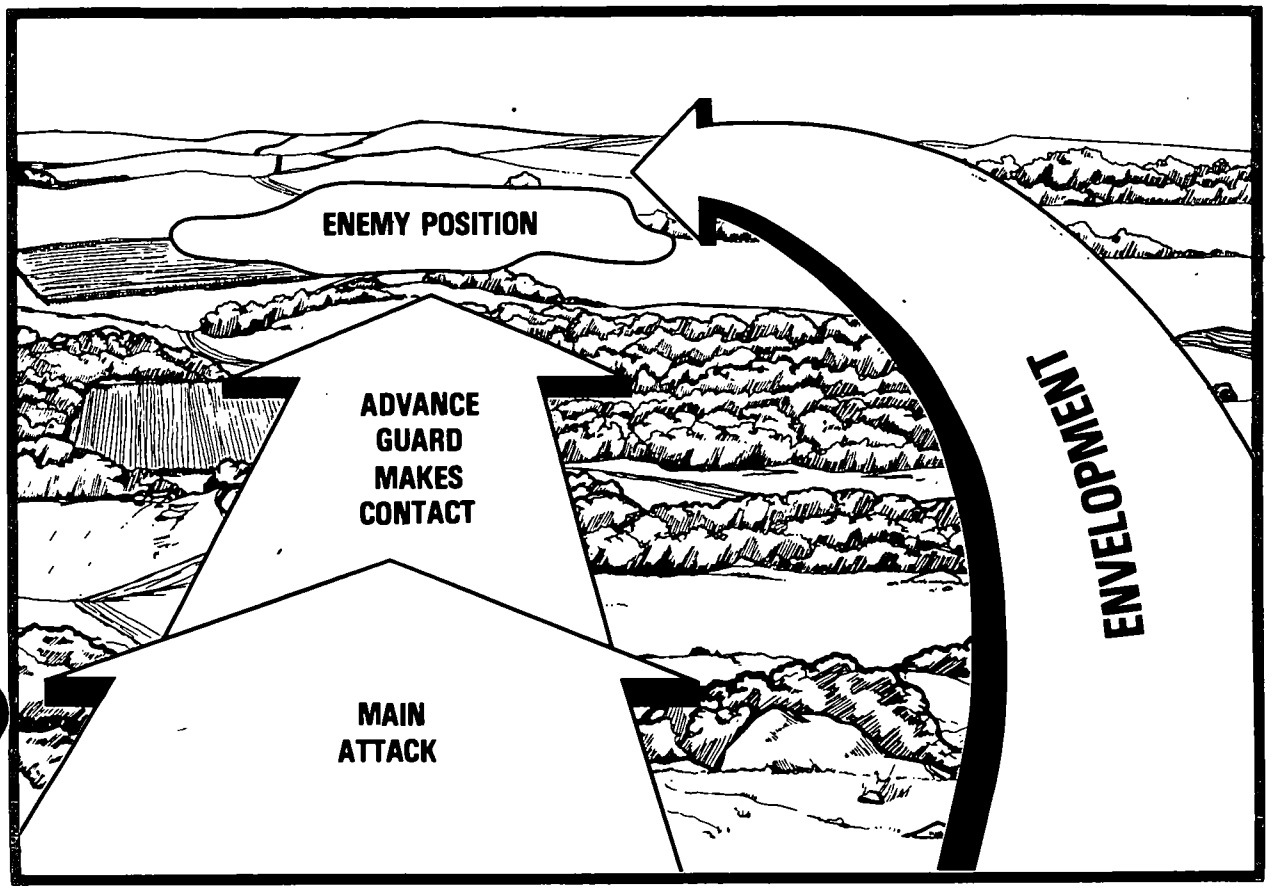
Types of offensive operations.

Movement to contact. Whenever US Army forces are on the offense and are not in contact with the enemy, they are moving to contact. Most attacks begin with a movement to contact. The purpose of movement to contact is to gain contact with the enemy. It is done in a way that risks the smallest possible part of the force while the bulk of the force is available to respond immediately when contact is made. When contact is made, the commander can develop the situation further by maneuvering forces, concentrating forces, and attacking.

MOVEMENT TO CONTACT



MEETING ENGAGEMENT



Meeting engagement. A meeting engagement occurs when a moving force contacts a moving or stationary enemy force about which little is known. The action ceases to be a meeting engagement when the situation has been developed and other actions are undertaken, such as a hasty or deliberate attack.

The primary goal, when contact is made, is to gain the upper hand by overcoming the enemy rapidly before he can react effectively. To do this, the commander must have his force in a good posture when contact is made, develop good information about the situation, and issue orders for action immediately.

Bypass. An enemy force that poses a negligible threat to the attacker may be bypassed. If the enemy force does represent a significant threat, it must be destroyed or fixed in position. Any bypassed enemy must be reported so that following forces will not be surprised.

While the maneuver force may bypass some enemy units, it will be necessary to contain others until they can be destroyed by following forces or until they surrender. Because the attacker has

the initiative, the force assigned the task of containing the enemy may be smaller than the force contained. It carries out its mission by using direct and indirect fire suppression, pinning down the enemy force so that it cannot maneuver against or fire effectively on bypassing forces.

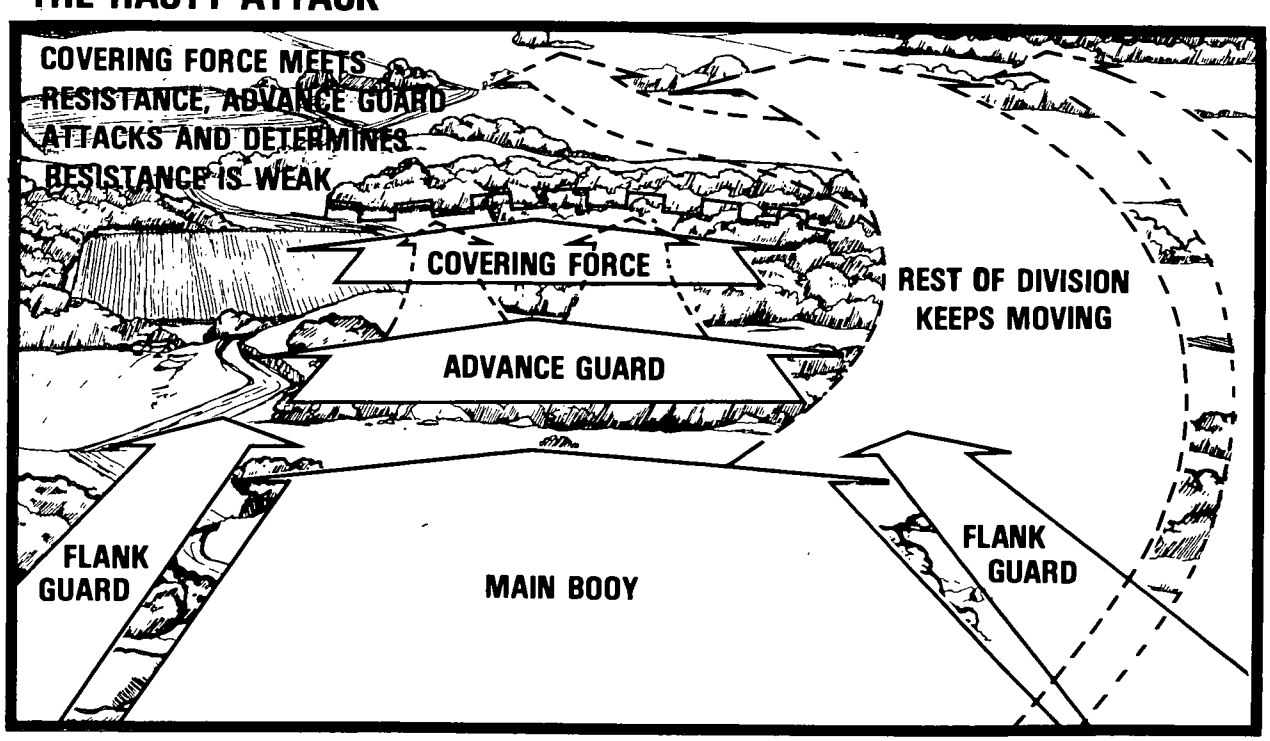
The attack. When contact is made, information about the situation must be reported to higher headquarters as quickly as possible. Of immediate importance is the size of the enemy force and the commander's assessment of his chances for success. As the battle develops, the availability of combat and combat support resources becomes increasingly important.

If a hasty attack is to be executed, fragmentary orders are issued immediately to set in motion battalion task forces, field artillery, attack helicopters, and close air support in sufficient strength to break through weak spots or to envelop open flanks. Speed is most important. If momentum is lost, the hasty attack can fail.

Some attacks may be deliberate from the outset when good information about the enemy is available. Such attacks usually start with a passage through a force in contact.

Normally, there will be two broad options available when a deliberate attack has breached enemy defenses successfully. The first is to press forward with committed forces toward the next echelon of enemy defenses or the enemy rear area.

THE HASTY ATTACK



The second is to turn left or right to roll up more enemy positions, one after another, from the flank, while another force exploits the breach.

Exploitation and pursuit. The ultimate objective of combat operations is to destroy the enemy forces. Exploitation and pursuit accomplish this objective. A breakthrough may be achieved gradually or abruptly. Enemy defenses often consist of belts, echelons, and lines of positions. Having broken through one, it is often necessary to break through another. The more rapidly this can be done, the less likely succeeding defensive lines will be fully prepared. When it can be recognized that the enemy is having trouble maintaining the overall continuity of his defense, the attacker orders exploitation and pursuit.

Exploitation. The purpose of the exploitation is to prevent the enemy from reconstituting an organized defense or executing an orderly withdrawal. This can be done by advancing rapidly toward the enemy rear area, bypassing small pockets of resistance, and destroying lightly defended and undefended installations and activities. The exploitation is usually executed on a broad front with divisions or brigades moving abreast. A terrain objective, often a considerable distance away, is assigned to the exploiting force. It may be a critical communication center, a mountain pass, or other area which, if captured, significantly contributes to the disruption of organized enemy resistance. The objective may simply be an orientation point for fast-moving forces.

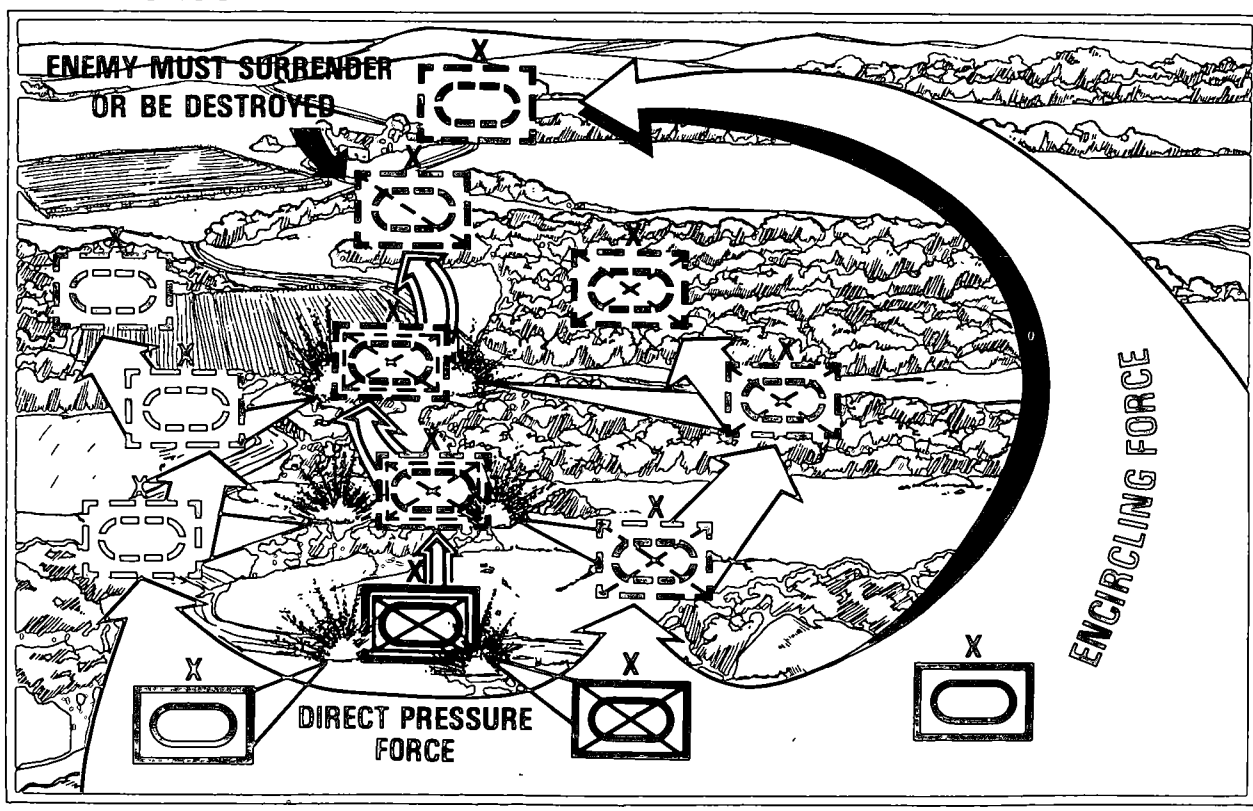
Pursuit. The purpose of pursuit is to destroy completely an enemy force that has lost its ability to defend or delay and is attempting to disengage and withdraw. Unlike the exploitation where the attacking force seeks to avoid enemy combat units and destroy the enemy support system, the pursuit *focuses* on the major enemy force. Terrain objectives may be assigned to orient pursuing forces and will usually be very deep into enemy territory. Pursuit operations require:

- **A direct pressure force—to deny enemy units any chance to rest, regroup, or resupply by keeping them in flight.**
- **An encircling force—to envelop the fleeing force, cut its escape route, and—in conjunction with the direct pressure force—attack and destroy the enemy force.**

Normally, a follow and support force is employed also in exploitation and pursuit operations. It is used to—

- **Destroy bypassed enemy units.**
- **Relieve in place any supported units that have halted to contain enemy forces.**
- **Block reinforcements.**
- **Secure lines of communication.**
- **Guard prisoners, key areas, and installations.**
- **Control refugees.**

THE PURSUIT



THE CANNON BATTALION IN OFFENSIVE OPERATIONS

The commander of a maneuver force on the offensive will expect his supporting field artillery to accomplish the following:

MOVEMENT TO CONTACT	ATTACK	EXPLOITATION/ PURSUIT
Provide immediately responsive fires to lead company teams. Suppress enemy indirect fire positions. Attack deep targets with massed fires. Suppress enemy air defense and direct fire positions. Screen friendly maneuver units with smoke.	Soften enemy defenses before the attack by prearranging short, violent preparations. Neutralize or suppress hostile forces, weapons, observation posts, and electronic jammers that could impede the attack. Suppress the enemy on the objective, obscure his vision, and screen friendly movement. Neutralize resistance during the final assault. Isolate the objective with fires beyond and to the flanks. Break up counterattacks and prevent enemy reinforcement during the consolidation.	Suppress pockets of resistance to be bypassed. Support hasty attacks required to overcome resistance that cannot be bypassed. Fire on retreating enemy units to slow, demoralize, and destroy them. Suppress enemy rear guard and strongpoint units. Mass fires on chokepoints along the enemy's retreat routes.

The remainder of this chapter tells how the cannon battalion accomplishes movement to contact, attack, and exploitation/pursuit in terms of the 10 basic tasks discussed in chapter 1.

Movement to contact.

The movement to contact is characterized by decentralized control and extremely responsive fire support to compensate for the relatively small amount of maneuver power forward.

FM 6-20

During the movement to contact, field artillery support must be poised to provide immediate fires to the lead company teams. The most pressing requirement is for fast suppressive fires. The following considerations are critical to successful support of a movement to contact.

Target acquisition. Target acquisition resources should be positioned well forward to maximize range capabilities and to provide early detection of enemy mortars and artillery that could impede the forward movement of maneuver forces. Normally, each direct support field artillery battalion will have at least one weapon locating radar attached from the division artillery target acquisition battery (TAB). The DS battalion S3 must insure that the WLR is displaced forward as the movement to contact progresses. Normally, radars will be positioned within the defensive perimeter of one of the firing batteries, and survey control will be extended from the battery position to the radar site. The DS battalion S2 orients radars, assigns sectors of scan, and gives cuing instructions, unless otherwise directed by division artillery. Field artillery aerial observers are a valuable source of battlefield information. Cannon battalions have no organic FAAO capability but can request FAAO support from division artillery. The cannon battalion S2 plans FAAO missions to complement other target acquisition means such as weapon locating radars, fire support teams, and fire support officers.

The S2 should brief FAAOs before each mission on:

- **Nets and call signs to be used.**
- **Available field artillery.**
- **Enemy forward air defenses.**
- **Any specific information desired by the pilot or observer.**

The battalion target acquisition plan must be integrated with the supported force target acquisition plan. Based on established target acquisition priorities and the maneuver commander's guidance, the battalion S2 establishes priorities for target acquisition assets under battalion control. FISTs and FSOs usually receive the same priorities through maneuver channels.

Survey/met. When the movement to contact begins, displacements will be frequent and formal survey control may give way to hasty survey techniques. If friendly forces have recently operated in the area, the cannon battalion reconnaissance/survey officer should request (through the division artillery survey officer) any information available regarding survey already established in the area.

The battalion S3 must keep division artillery informed of planned moves so that the division artillery met section can be displaced to stay within valid met range of cannon battalions supporting the movement to contact.

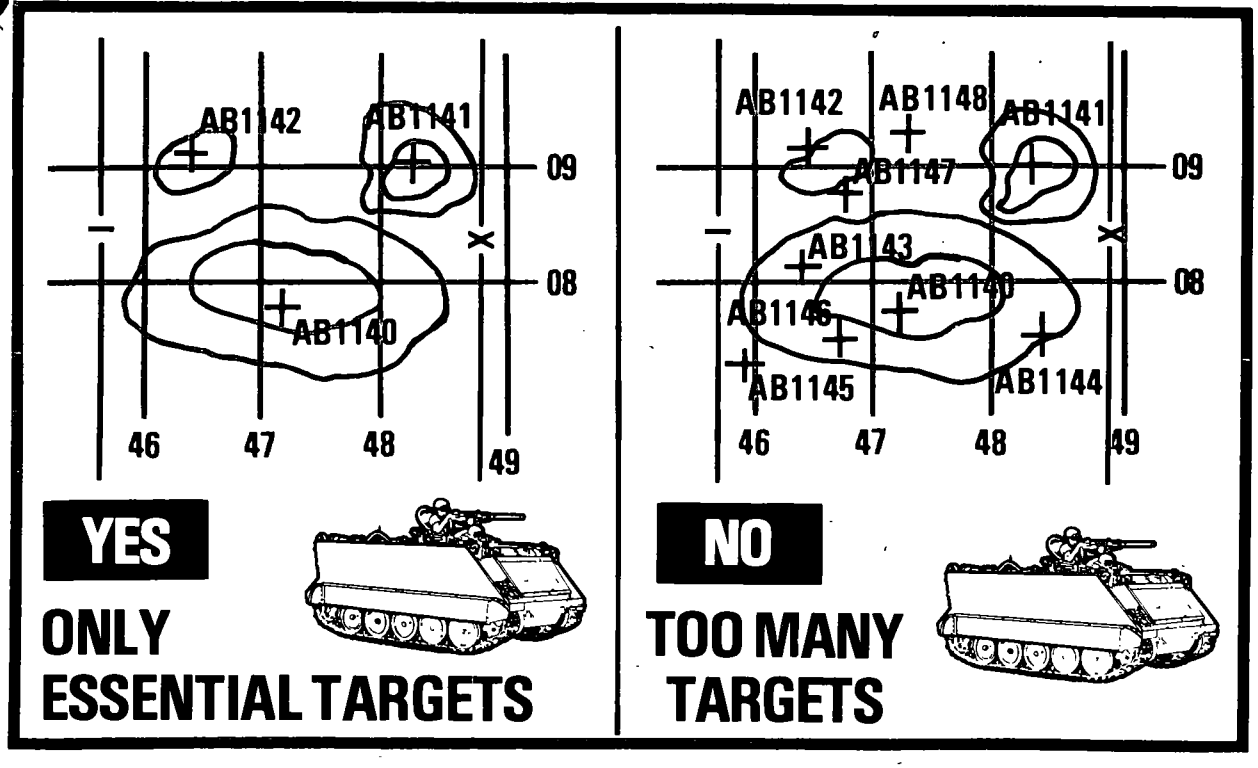
Fire planning. During movement to contact, field artillery fire planning must focus on:

- **Providing immediate fires to suppress enemy direct fire weapons.**
- **Providing smoke to screen the company team movement.**

The FIST chief and the company team commander select targets along the route of advance and submit them through the battalion FSO to the DS battalion fire direction center. Only essential targets should be planned. Too many targets result in confusion and could delay responsive support. The FSO should be in the best position to judge the number of planned targets that can be handled without overloading the system, degrading responsiveness, or exceeding the controlled supply rate.

The FSO needs to insure that FISTs plan targets based on good judgment and good information. He must step in whenever it is becoming apparent that the FIST chief is planning "measle sheets" that will needlessly overtax the logistics system and the cannon battalion's capability to respond rapidly with planned fires. Targets submitted to support the movement to contact can be designated as "priority" suppressive targets by the company team commander. A platoon is laid on each priority with firing data on the guns and rounds fuzed. It is then

CO/TM FIRE PLANNING



necessary to insure that priority targets are "purged" as the company team moves past them. Screening smoke may be used extensively during the movement to contact.

When smoke is requested, the FSO should consider using the maneuver battalion mortars to build the smokescreen (rapid rate of fire) and field artillery to sustain it. If FAAOs are available, they can be used to adjust in and maintain the smokescreen while the FIST chief focuses his attention on the other fire support needs of the company team.

Tactical fire control. Suppressive fires will be critical during a movement to contact. Targets can be suppressed with a battery or less depending on target size; therefore, fire control should be decentralized. FISTs and FSOs should call suppressive missions directly to battery fire direction centers. The battalion FDC monitors, follows the progress of the mission, and is prepared to provide additional fires when and where necessary. *Remember,* the effects of suppressive fires last only as long as the fires are continued. Suppressive fires must be continued for as long as the target being engaged can affect friendly elements adversely. High explosive/variable time, improved conventional munitions, and smoke are the munitions best suited for suppressive fires. The figures in chapter 1 list, in priority, optimum shell/fuze combinations for various personnel and materiel targets.

Plans and orders (dedicated battery). If batteries are dedicated during a movement to contact, they are *totally* responsive to a maneuver company team to the exclusion of all other maneuver elements. The result is a *high* degree of responsiveness (30 seconds plus time of flight on priority targets) to the lead company team. Dedicated battery tasks have certain implications that the S3 must take into consideration during the planning effort:

- **Dedication is recommended by the cannon battalion commander and approved by the maneuver brigade commander. Once dedication is in effect, it can be terminated only by the brigade commander. Conditions for termination of dedicated status are listed in FM 6-20, appendix B.**
- **A dedicated FM net (normally the designated battalion fire net assigned to the battery) must be provided. The DS battalion and the FSO *only monitor* this net.**
- **The DS battalion FDC should not send fire missions to the dedicated battery.**
- **The DS battalion FDC must be prepared to augment the dedicated battery's fires. When possible, dedicated battery missions should be monitored and followed in a "do not load" status by the nondedicated batteries. If the target requires expenditures that exceed the dedicated battery's capability, the DS battalion can respond immediately with additional fires.**

Dedicating a battery results in a tremendous increase in fire support immediately available to a company. Batteries are dedicated *only* during a movement to contact, when adequate

field artillery is available, the enemy situation is vague, and contact is expected.

Positioning/displacement. In a movement to contact, the impetus is *forward,* and the key word is *move.* The S3 should have positions planned at least two moves ahead. Route and position area reconnaissance should be continuous. Dedicated batteries should be positioned with 80 percent of their range extending beyond the line of departure to minimize the need for early displacement. If FAAOs are available, the S3 should instruct them to note and report positions and areas forward that are suitable as firing battery or trains locations. Position areas selected and routes planned must be coordinated with the maneuver force in whose zone the routes or positions are located. The fire support officer is located where the action is and provides timely advice to the maneuver commander as the operation progresses. If an unexpected acceleration in the advance rate of the lead company team occurs, the FSO should notify the DS field artillery battalion FDC immediately so that firing batteries can be alerted and movement orders can be issued.

Communications. When the movement to contact begins, wire will give way to radio as the primary communication means. FISTs moving with the lead company teams may exceed radio range or may be masked by a terrain feature. *Remember,* battalion FSOs have a retransmission capability and can act as a communication link between the FIST and the DS battalion/batteries when necessary. Dedicated batteries get dedicated fire nets. *Only* FIST and battery personnel talk on this net. Wire should not be played down just because of frequent moves. Wire should be laid if possible, particularly between FSOs and the DS battalion. Radio nets must be opened selectively based on volume of traffic. The DS battalion FDC is net control station for all battalion fire nets. The nets must be policed of extraneous traffic. Short transmissions lessen our vulnerability to enemy radio direction-finding and jamming stations.

Combat service support. Class V should be forward. Ammunition in excess of the unit's carrying capability is stockpiled when necessary. If the unit displaces before this stockpiled ammunition is fired, follow-on units (trains) can police it up. The S3 and S4 must coordinate closely on the positioning and movement of ammunition. Normally, dedicated batteries will not be moving while dedication is in effect. Smoke, HE, and ICM will be in heavy demand for the suppression and screening fires critical to lead company teams. This type of ammunition is stockpiled at the dedicated battery position. The S3 must keep the executive officer, S4, and battalion ammunition officer informed of all battery moves so that combat service support, particularly

ammunition trucks, can be dispatched to the proper location. Because of the frequent moves, special efforts must be made to keep the ammunition and other combat service support truck drivers apprised of firing locations and usable routes. Echeloning trains to keep the resupply movement forward should be considered.

Hasty attack.

> **The primary concern in the hasty attack is to react quickly with fire and maneuver to maintain the momentum of the attack.**
>
> **FM 6-20**

Hasty attacks are frequently an extension of or a part of movement to contact, exploitation, or pursuit. They are characterized by the swift application of combat force to overcome enemy hasty defenses and to maintain offensive momentum. A cannon battalion may be required to support a hasty attack by one element of the supported force while other elements are still in a movement to contact. Considerations for supporting hasty attacks are similar to those for supporting a movement to contact. Additionally, cannon battalions supporting hasty attacks should consider the following tasks.

Target acquisition. Targets acquired by FISTs and FSOs requiring close support fires will increase. The battalion must prepare to handle this increased load, move weapon locating radars forward on short notice to keep up with the attack, and acquire and deliver suppression of enemy air defense (SEAD) fires if FAAOs and close air support (CAS) are to be used. Sound and flash may not be available if the battle has been moving rapidly.

Fire planning. In the hasty attack, there will not be much time to plan fires—maybe minutes. The requirement for the attack develops rapidly, and the maneuver force may attack from the march. This means that FISTs and FSOs must stay keenly attuned to the battle progress and *anticipate* fire support. Any time enemy resistance increases rapidly, FISTs and FSOs should size up the situation and *begin planning*.

Fire support teams and fire support officers should develop hasty fire plans to support this attack, planning fires short of, on, and beyond the objectives. These planned fires must include suppression and obscuration of enemy overwatch positions and will be, of necessity, informal and include only minimum, essential targets. Additionally, planning should consider continuing the movement to contact when the hasty attack is completed. Often, the maneuver force executing a hasty attack *will not stop* after the attack, but will continue movement to maintain momentum. See FM 6-20, appendix I, for details on deliberate and hasty fire planning.

Plans and orders. Normally, there is not enough time to plan and execute a scheduled preparation. Plans and orders will be informal—oral, personal contact, or FM (frequency modulated) communication. The FSO must inform the DS battalion as soon as the supported force anticipates hasty attacks in any portion of the brigade zone. If a company team with dedicated battery support executes a hasty attack, the dedicated mission should be terminated, allowing for increased, coordinated mass fires. FM 6-20, chapter 4, explains procedures for terminating dedicated battery support.

Displacement. Untimely displacement that would reduce the amount of field artillery support in position and ready to fire must not occur during the hasty attack. If numerous hasty attacks are in progress and repositioning of fire units is necessary, movement by battery should be conducted. This allows for maximum fire units in position and ready to fire at any given time. Be prepared to displace forward rapidly if hasty attacks are successful.

Communications. Increased calls for fire from FISTs and FSOs will increase the volume of radio traffic and may necessitate opening additional fire nets. Operations security (OPSEC) must be stressed, since the enemy can be

expected to increase his direction finding and communications jamming in the area of the hasty attack. See chapter 4 for OPSEC countermeasures.

Deliberate attack.

> **Deliberate attacks concentrate forces and fires to create a hole in the enemy defenses and then rapidly push forces through to secure deep objectives in the enemy's rear area.**
>
> **FM 6-20**

When a commander determines that he has encountered a strong enemy force in well-prepared positions that a hasty attack cannot overcome, he may order a deliberate attack. A deliberate attack aims at a penetration on a narrow front or an envelopment around an assailable flank, seeking to move deep into the enemy's rear. It is characterized by more detailed knowledge of enemy positions, deliberate planning, and greater volume of supporting fires. A deliberate attack may be preceded by passing a fresh, highly mobile force through a force in contact. During the forward passage, forces are concentrated in a small area and are extremely vulnerable to enemy action. For this reason, a passage must be well planned and executed *rapidly*. Passing one force through another imposes unique considerations for supporting field artillery.

Field artillery support for a forward passage preceding a deliberate attack.

Target acquisition. Weapon locating radars should be positioned just behind the line of contact to take maximum advantage of their range capability. If sound/flash is available, it also should be well forward and should complement the coverage of the weapon locating radars. The locations selected for target acquisition resources must be coordinated with the moving force to insure that they do not interfere with the forward movement of that force.

Fire planning. The moving force commander may or may not want a preparation planned. If surprise is a key factor, he will probably go without a preparation. Suppressive fires should be planned on known or suspected enemy direct and indirect fire weapons locations, smoke mixed with HE/VT and point detonating on command observation posts, and screening smoke in the area of the passage. Remember, both the moving force and the stationary force are planning fires in the same zone. The FSOs from both forces must compare and consolidate target lists and resolve duplication *before* the lists are sent to the DS cannon battalion for scheduling.

Plans, orders, coordination. The moving force field artillery commander must establish liaison with the stationary force field artillery commander *as early as possible* to determine how the passage will be supported, what responsibilities each field artillery unit will have, and what coordination will be required. The following specific information must be exchanged:

- **Current targeting information.**
- **Good field artillery positions and routes of march in the area (priority of field artillery positions goes to the field artillery with the passing force).**
- **Target acquisition capabilities.**
- **Survey control.**
- **Coordination of communication nets.**
- **Available intelligence about the enemy.**
- **Meteorological data.**

Usually, the mission of the field artillery with the stationary force is modified to "augment the fires" of the field artillery with the moving force. The details of this modified mission must be worked out in advance to include:

- **How calls for fire will be answered.**
- **What radio nets will be monitored.**
- **How liaison will be accomplished.**
- **Planned targets.**

Normally, this coordination is accomplished by the supporting field artillery S3s. Field artillery with the stationary force is still DS to that force and will only augment the fires of the moving force field artillery when it does not interfere with the DS mission. The final agreement must provide field artillery support for both forces, but emphasis should be placed on giving maximum support to the moving force.

Positioning. The stationary force field artillery should be positioned far enough forward to—

- **Permit engagement of deep counterfire targets that could interfere with the passage.**
- **Provide the capability to augment the fires of the moving force field artillery without the need for untimely displacement.**

The moving force field artillery should be positioned as close to its designated routes as possible and should plan to displace by battalion if reinforcing field artillery is available. The reinforcing field artillery answers calls for fire from the FISTs/FSOs while the DS field artillery is moving. When the DS field artillery has passed through and has reestablished communications with FISTs/FSOs, the reinforcing field artillery displaces forward by battalion. If reinforcing field artillery is not available, the DS field artillery should move by echelon to insure that field artillery is in position and responsive to the needs of the moving force at all times.

Reconnaissance. The field artillery with the stationary force should provide information on routes and

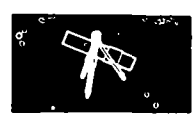
suitable positions in the zone to the field artillery with the moving force. Priority of positions is to the moving force field artillery. Positions selected should provide cover and concealment to reduce vulnerablity to enemy air attack. Moving force field artillery and the stationary force field artillery should coordinate position locations to preclude a "bunching up" of field artillery units that would present a lucrative target to the enemy.

Communications. Wire communications should be laid to the maximum extent possible. Coordination should be accomplished face to face, by wire, or by messenger to preclude lengthy FM traffic. Radio transmissions should be minimized and kept as brief as possible to avoid compromising the situation.

Field artillery support for the deliberate attack. Field artillery support for the deliberate attack is characterized by:

- **Detailed planning based on time available and more detailed knowledge of the enemy.**
- **Available time to develop the enemy situation and develop detailed, effective preparation targets.**
- **Time to reposition units before the attack commences.**

Target acquisition. If possible, weapon locating radars should be located close to firing battery areas, and available survey control should be extended from the battery area to the WLRs. As the attack gains momentum, the S2 and S3 must plan jointly the forward displacement of target acquisition resources. Weapon locating radars must be included in the DS cannon battalion's survey plan. During the attack, consolidation of objectives is a critical time for maneuver forces. They will be vulnerable to enemy counter-attacks by indirect fire. As objectives are taken, WLRs must be displaced forward rapidly to areas near the objective so that they can range the ascending trajectory of incoming rounds.



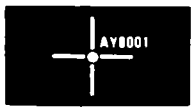
Survey, meteorology, and registration. The considerations for movement to contact apply. Hasty survey may be the rule for fire unit locations and target acquisition resources when the attack begins. The DS cannon battalion S3 must coordinate his plans for forward displacement with division artillery to insure that the division artillery met section is displaced forward as the attack progresses. Met + VE should be used in lieu of registrations. *Remember,* the enemy is defending. His target acquisition resources are emplaced and ready to detect firing battery locations based on firing, especially during long registration missions. If mets are not available or if muzzle velocities are not

current, registrations away from the primary azimuth of fire are considered. The DS battalion S3, with the battalion reconnaissance/survey officer and FIST chief, will establish registration points in the brigade zone for DS *and* reinforcing field artillery. If general support and general support reinforcing field artillery battalions desire to register their batteries in the brigade zone, they *must* coordinate through the DS field artillery battalion. The DS battalion coordinates all registration points with the supported brigade through the brigade fire support officer. Rearward registration points will take considerable coordination and prior warning of friendly units in the vicinity of the chosen registration points; however, the increased accuracy and enhanced survivability by minimum exposure of trajectories to enemy detection devices make the effort worthwhile.

Tactical fire control. As the attack gains momentum, calls for fire will increase and the cannon battalion may be faced with more targets than it can effectively engage. When this situation occurs, the FDC must respond first to calls for fire from the maneuver element that has priority of fires. Priority of fires is specified in paragraph 3a(2) of the supported force operations order, but may be changed by frag order as the attack progresses.

Requests for immediate fires during a preparation may occur during a deliberate attack. If many targets are planned, the DS battalion might find it necessary to include all fire units for which it has fire planning authority in the preparation. When this situation exists and targets of opportunity appear that require immediate engagement, the S3 (or FDO) must take fire units from the preparation that are engaging lower priority targets. Response time must also be considered because antitank guns (ATG), antitank guided missiles, and artillery fires can slow or halt a maneuver force's forward momentum. If a fire unit is engaging a preparation target close to the target of opportunity, the S3 or FDO should consider pulling that unit from the preparation, giving it a range or lateral shift correction to bring the rounds close to the target, and then telling the FIST to adjust the rounds on target.

Units diverted from a preparation for targets of opportunity reenter the preparation schedule at the time they finish firing the target of opportunity and shoot the next target shown on the schedule. *No attempt* should be made to fire targets missed in the preparation. The preparation is on a time schedule that is carefully coordinated with the scheme of maneuver. Maneuver forces expect preparation fires to be shifted and lifted at specific times. If units pulled from the preparation do not reenter at the *current* time indicated on the schedule of fires, their fires could extend past the completion time ordered by the commander and jeopardize maneuver forces. The S3 notifies the maneuver S3 about targets not fired during the preparation and, if requested, engages the targets as soon as possible after the preparation is completed.



Fire planning. Preparation fires are normally planned to support a deliberate attack. Planned targets oriented on known or suspected enemy defensive positions ahead of and on the flanks of the attacking force, *and* on known or suspected enemy direct and indirect fire positions and command observation posts are most common targets. Detailed instructions for planning preparations are contained in FM 6-20, appendix I.

When planning preparation fires, the DS cannon battalion should consider:

- **Stockpiling class V at fire unit locations prior to firing the preparation.**
- **Availability of ammunition.**
- **Obtaining a valid met within 1 hour of the time that the preparation is to be fired.**
- **Insuring that batteries scheduled to fire the preparation are in position and ready to fire before the preparation commences.**
- **Requesting ammunition for immediate expenditure (ammunition in excess of a unit's basic load that can be drawn in anticipation of heavy ammunition expenditures). Requests for ammunition for immediate expenditure must be approved by the requesting unit's next higher headquarters.**

As the attack progresses, FISTs and FSOs may request that groups and series of targets be planned to support specific phases of the attack. They may be requested "on call" or to be fired at a specific time. Suppression of enemy air defense and counterfire programs will be planned as directed by higher headquarters or by the supported force. FM 6-20, appendix I, contains detailed instructions for scheduling groups, series, and programs of targets.

Reconnaissance, positioning, and displacement. All considerations for movement to contact apply except those portions discussed for the dedicated battery. Reconnaissance for new positions to support the attack must be continuous. In displacing forward, the DS cannon battalion commander/S3 must insure that sufficient field artillery is always in position to support the maneuver force. If no reinforcing field artillery is available, the DS cannon battalion should displace forward by leapfrogging batteries. Suitable locations for hasty occupations should be identified along the routes to facilitate the conduct of emergency occupations (hip-shoots). If reinforcing field artillery is available, forward movement should be by echelon and staggered between the DS and reinforcing cannon battalions. Displacement will be controlled by the DS cannon battalion S3.

Combat service support. Considerations for movement to contact apply, except those portions pertaining to the dedicated battery. As the attack progresses, resupply lines will become extended. Trains should be well forward and located in areas that afford good trafficability and a suitable landing area for helicopters in case aerial resupply is used.

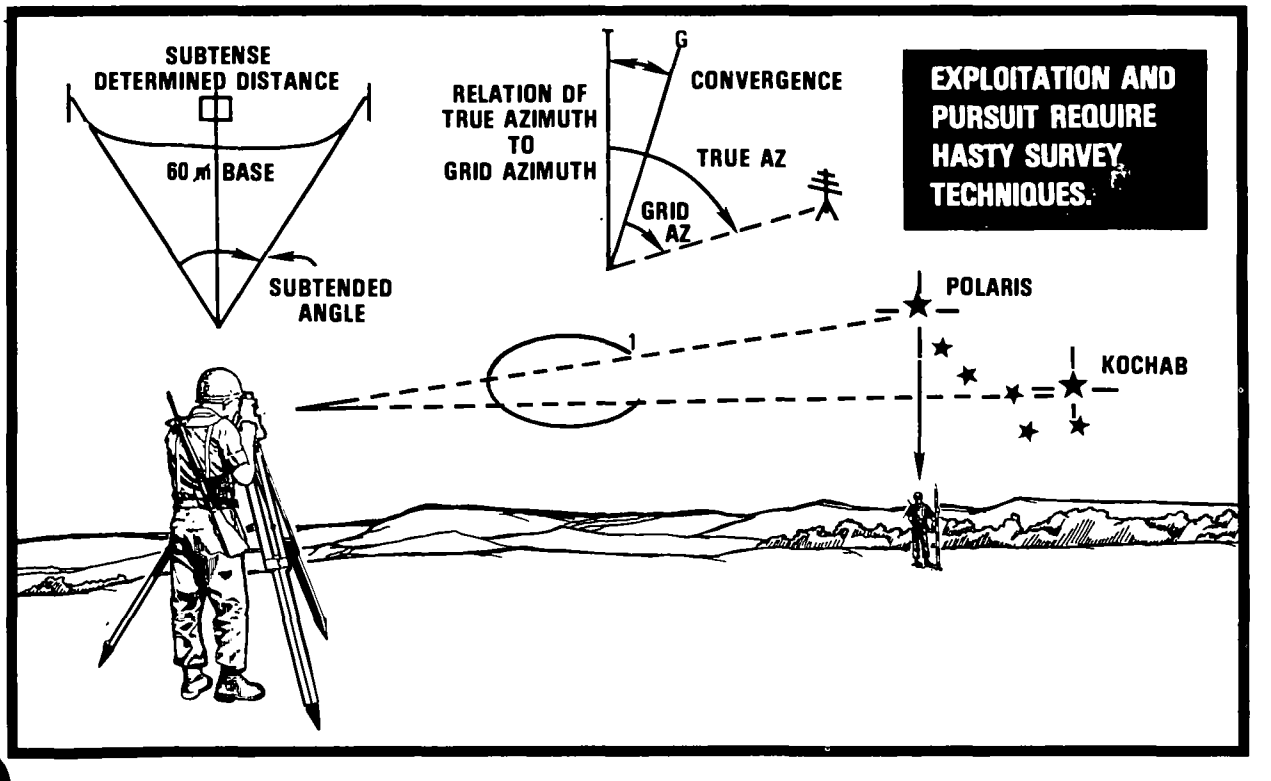
Exploitation and pursuit.

> **Exploiting forces strike swiftly to deep objectives to cut lines of communications and surround and destroy enemy forces.**
> **FM 6-20**

The purpose of the exploitation and pursuit is to prevent the enemy from reconstituting an organized defense or conducting an orderly withdrawal and to annihilate the retreating enemy force. Supporting the exploitation is similar to supporting a movement to contact except that dedicated batteries are not considered to support an exploitation. Other considerations discussed under movement to contact apply to exploitation. Additional field artillery considerations for supporting exploitation and pursuit follow.

Target acquisition. A cannon battalion DS to an exploiting brigade should request that two WLRs from the division artillery target acquisition battery be attached. With two radars, the S3 can leapfrog them forward, keeping one in position ready for cuing instructions while the other is displacing forward.

Meteorology, survey, and registration. The field artillery battalion with the exploiting force should coordinate with division artillery to insure that the met station is displaced forward in time to provide continuous met support. Registrations will be minimal during the exploitation or pursuit since batteries will be moving



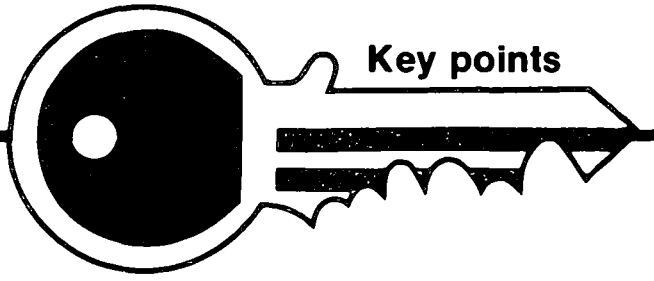
rapidly *and* most fires will be in response to requests from fire support teams and fire support officers. Consideration is given to registering in conjunction with an observed fire mission *if* the target and fire unit can be accurately located. If met is available, muzzle velocities are current, and fire units are accurately located, met + VE is considered. Survey will be limited to hasty techniques when the exploitation/pursuit commences.

Reconnaissance. In the exploitation and pursuit, the cannon battalion will displace frequently. The commander, executive officer, and S3 must continuously insure that new positions are reconnoitered. Time may preclude ground reconnaissance and air reconnaissance should be used whenever air resources are available. Fire support teams and fire support officers can provide information on possible positions and routes as they advance with the maneuver force. Field artillery aerial observers should also be tasked to be on the lookout for suitable position areas whenever they are airborne. The field artillery with the follow and support force are told where the *good* positions and routes are so that they can use them as they move forward.

Communications. The battalion FSOs have a retransmission capability. If company teams are advancing rapidly and FISTs are moving out of FM communication range, the retransmission capability is used to relay from the FISTs back to the DS battalion and batteries. A communication link should be maintained between the exploiting force and the field artillery supporting the force in contact.

Combat service support. During the exploitation and pursuit, advance may be slowed more by vehicle breakdowns and fuel and ammunition shortages than by combat losses and enemy action. As a general rule, 4 to 6 days of all supplies should be carried. Disabled vehicles that can be readily repaired should be towed forward to be repaired at the earliest opportunity. Priority of resupply should be to class V, petroleum, oils and lubricants (POL), and repair parts. The ammunition officer must insure that ammunition trucks dispatched to firing batteries know where the batteries are located and what routes are to be used. It will not be uncommon for batteries to be displaced forward while class V resupply operations are in progress.

Appendix F contains scenarios that discuss the considerations presented in this chapter within the framework of a tactical situation.



Key points

Movement to Contact

- Use immediately responsive dedicated battery support to lead company teams.
- Use smoke to screen friendly movement.
- Shift suppressive targets forward as lead company teams advance.
- Plan suppressive fires for company teams that do not have dedicated support.
- Plan and fire priority suppressive targets in support of lead company teams.
- Plan fires to support hasty attacks.

Attack

- Schedule and fire a preparation to soften enemy defenses before the attack.
- Neutralize hostile forces that could impede the attack.
- Fire to support the assault and consolidation of the objectives.
- Isolate the objective with fires beyond and to the flanks.
- Displace forward as the attack progresses while simultaneously maintaining the capability to provide adequate, responsive fire support to the brigade.

Exploitation and Pursuit

- Suppress pockets of resistance to be bypassed.
- Suppress enemy rear guard and strongpoint units.
- Mass fires on chokepoints along enemy withdrawal routes.
- Keep up with the forward momemtum of maneuver forces while maintaining the capability to provide responsive support.

CHAPTER 3:

Defense

The purpose of defensive operations is to kill enough enemy soldiers and destroy enough enemy equipment to convince the enemy that his attack is too costly to continue. From time to time defensive operations are conducted for other major purposes—to concentrate forces elsewhere on the battlefield; to gain time; to preserve forces, facilities, or installations; or to control essential terrain.

This chapter tells the cannon battalion commander and his staff how to support defensive operations. Effective support is based on an understanding of defensive fundamentals, defensive maneuver operations, and enemy tactics.

Defensive fundamentals.

US Army forces should expect to be outnumbered at the onset of hostilities. When fighting outnumbered, it is especially important that the defender defeat the attacker and survive with a force that is able to continue military operations. Ideally, the defender should destroy each echelon in turn and be able to engage the next with an effective fighting force. If the defender is fixed by the enemy and subsequently destroyed, or if the defending force is so degraded by successive losses as to become ineffective, the battle will be lost.

Armored and mechanized divisions use both their mobility and firepower to best advantage in an *active* defense, economizing forces in less threatened areas to concentrate against main enemy thrusts. In an active defense, while the larger force is defending, its subelements may be counterattacking or disengaging to concentrate forces elsewhere.

The concept of an active defense is to defeat the attacker by confronting him with strong combined arms teams fighting from battle positions organized in depth. As the enemy attack moves into the defended area, it encounters fires of increased intensity delivered from the

front and especially the flanks. The defender constantly shifts forces to take maximum advantage of the terrain and put himself in a favorable posture to attack. Wherever possible, obstacles are used to stop, slow, or canalize the enemy attack, particularly in areas covered by the defender's weapons, or where the enemy will be especially vulnerable to attack by the defending force.

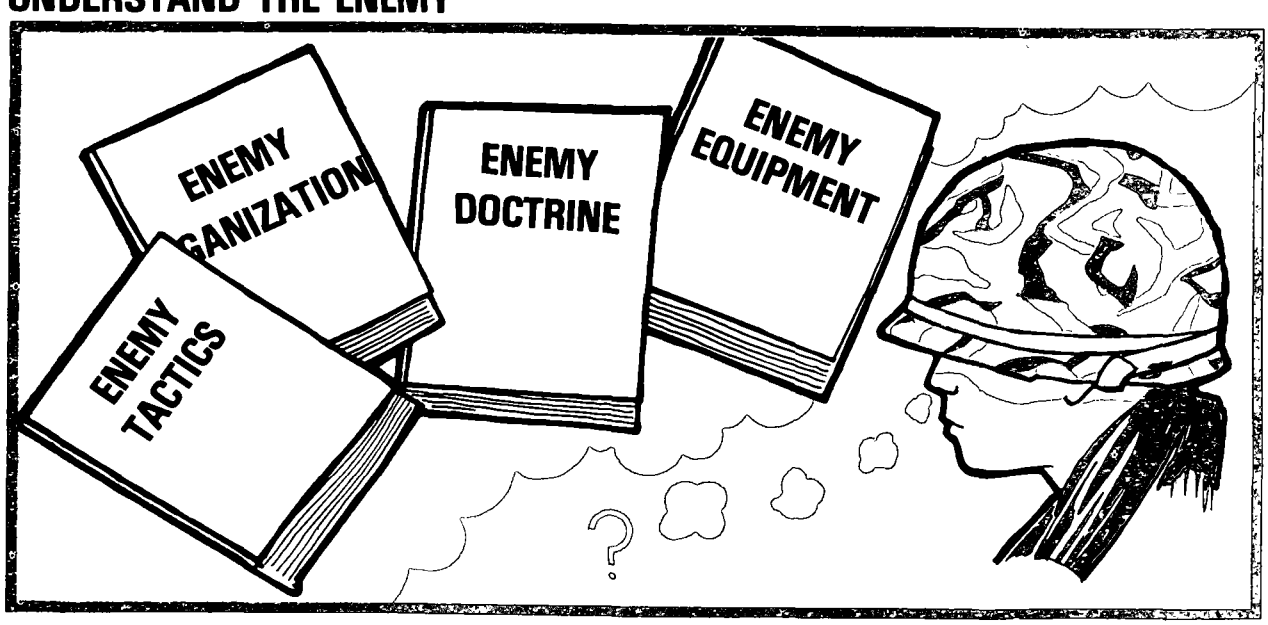
When the enemy attack begins to falter and his elements are exposed, the defender can often destroy even more enemy by attacking. Counterattacks may also be necessary to reoccupy critical terrain.

To slow the attack so there will be more time to engage many targets, the defender may need to occupy certain terrain for extended periods of time. In such cases, strongpoints may be established by companies or battalions. In a well prepared strongpoint, the unit in the strongpoint must hold onto terrain around which the battle pivots while other units fight from mutually supporting battle positions nearby.

Regardless of why the defense is undertaken or how it is described, several fundamentals govern the conduct of all defensive operations. These fundamentals are common to all levels of command, even though their application may vary at each level depending on the resources available to the commander.

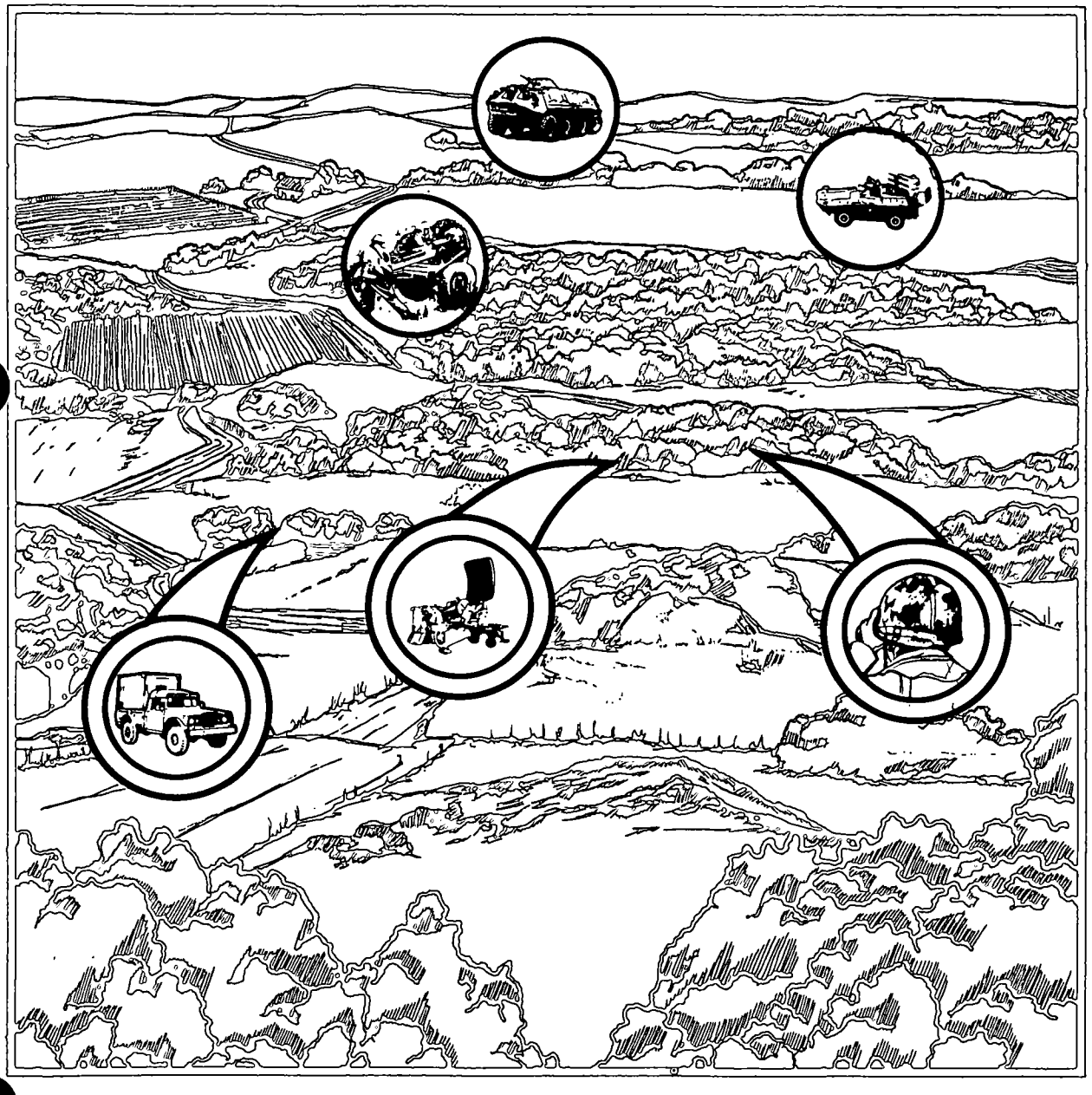
Understand the enemy. Commanders and staffs must have a thorough understanding of the enemy in order to defeat him. This means knowing about his weapons, tactics, maneuver doctrine, and fire support capabilities. This knowledge can provide the defender the edge he needs to defeat a numerically superior force because if enemy moves can be anticipated, then combat power can be decisively applied where it will hurt the enemy the most.

UNDERSTAND THE ENEMY



See the battlefield. The defender must undertake aggressive operations to learn where the enemy is, how he is organized, which way he is moving, and in what strength. As the battle unfolds, the defender must seek to establish a continuous flow of information, deny the enemy similar information of his own forces as he maneuvers to counter the enemy, and seek an opportunity to attack. Fire support teams and other field artillery target acquisition means are often the commander's primary means of combat information.

SEE THE BATTLEFIELD

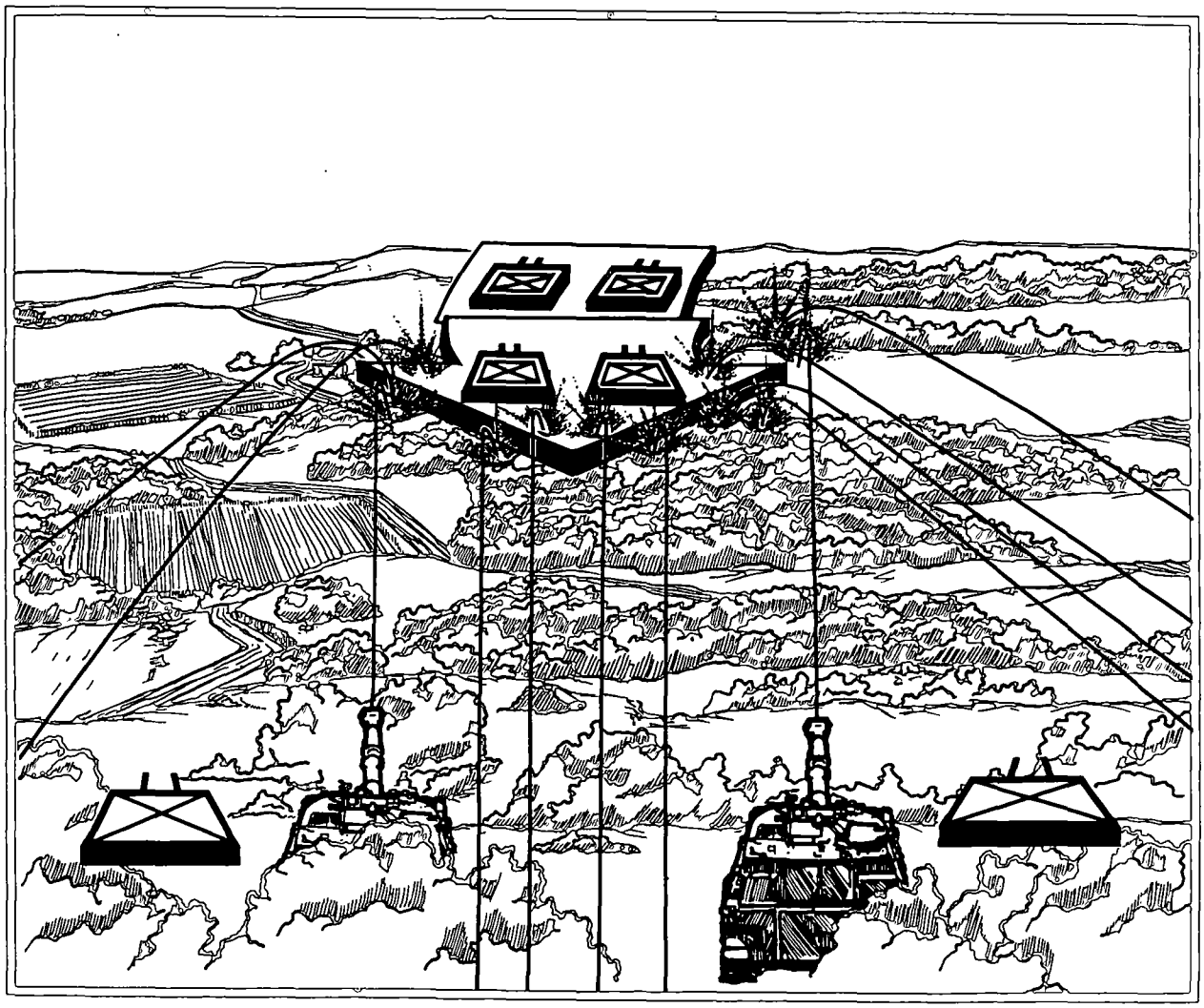


Concentrate at the critical times and places. The defender must decide exactly when and where he will concentrate his forces; he does this based on the results of his combat information and intelligence-gathering operations. He must also decide how much force will be required to defeat the enemy within the terrain and space limitations of the defensive area.

It may be necessary to concentrate up to six or eight maneuver battalions on one-fifth of the division's front to meet breakthrough forces that may number 20-25 battalions. Remaining ground is then covered with air and ground cavalry, remaining battalions, and attack helicopter units.

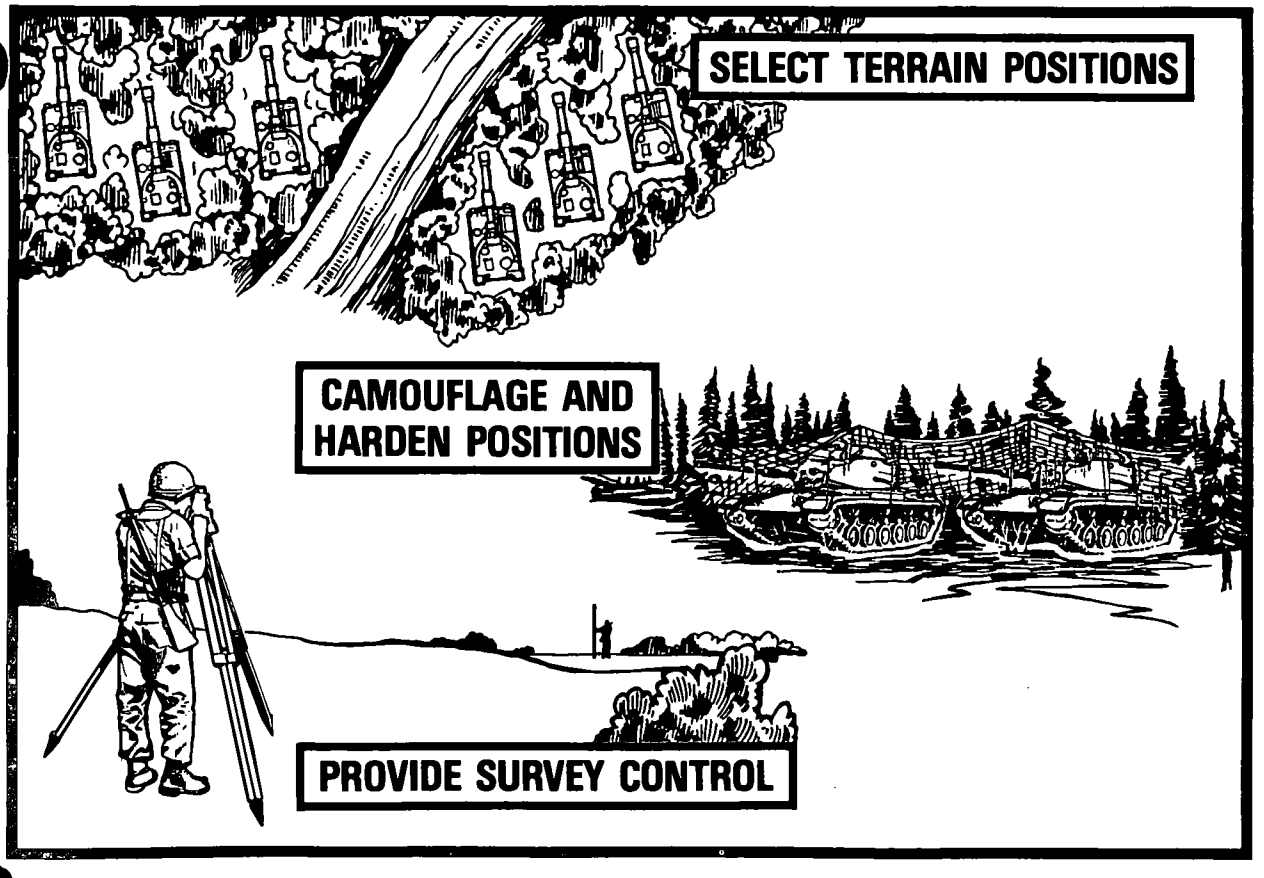
Field artillery fire can often be concentrated without moving firing batteries. In extended areas, however, field artillery batteries must be moved to positions within range of the main battle.

CONCENTRATE AT CRITICAL TIMES AND PLACES



Exploit the advantages of the defender. The advantages of the defender are numerous and permit a numerically inferior force to defeat a much larger attacker. Perhaps the defender's greatest advantage is the opportunity to become completely familiar with the terrain prior to battle. The attacker cannot do this. The defender can prepare the ground in advance by building obstacles and firing positions and improving routes between battle positions. Because of his unfamiliarity with the terrain, the attacker can only guess about the preparations the defender has made. The defender can fight from cover while the attacker is in the open. The defender can shoot from stationary platforms or positions while an attacker must move. The defender can shift forces from prepared position to prepared position swiftly so as to concentrate for successive engagements. The attacker must feel his way over the terrain, seeing each new compartment for the first time. The defender can plan communications, control measures, fires, and logistical support in advance to fit many predictable situations. The attacker must adhere to a predetermined course of action and risk being outmaneuvered, or he must alter his plans as the battle develops and suffer from uncoordinated effort.

EXPLOIT YOUR ADVANTAGES AS DEFENDER



Fight as a combined arms team. As friendly units converge on the critical battle site, brigade commanders commit them to combat according to their weapon capabilities and movement of the enemy force. The first increment of combat power available is usually the massed fire of all field artillery in range. Even if artillery fire does not destroy many armored vehicles, it causes tank crews to stay buttoned up, reducing their effectiveness. Field artillery can effectively discourage enemy infantry from dismounting to attack defending dug-in antitank weapons. Field artillery can also smoke overwatching forces covering the enemy attack.

As tank and mechanized battalions begin to arrive, the brigade commander cross-reinforces as necessary and assigns battle positions and missions to the commanders.

Enemy offensive tactics.

The enemy often attacks during periods of reduced visibility. He normally organizes for an attack with two echelons at each level of command. His formations are preceded by reconnaissance elements and an advance guard. These elements contain light tanks, lightly armored vehicles, motorcycle elements, and augmentation as required. Reconnaissance units attempt to bypass pockets of resistance, seek lightly defended areas, and pass intelligence to the advance guard and main body.

ENEMY INTELLIGENCE TARGETS

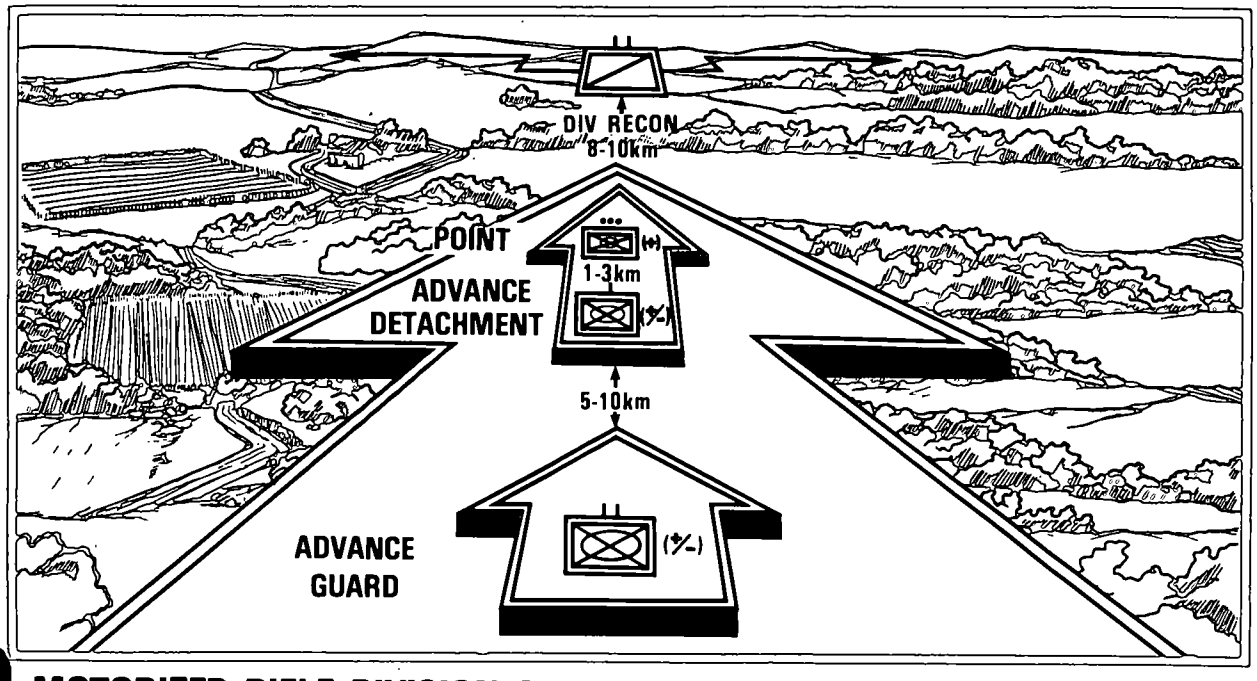
- **Command control headquarters.**
- **Mortar and field artillery locations.**
- **Antitank locations.**

Reconnaissance elements will not fight unless forced to do so, but they *will provide targeting information.* If the reconnaissance element becomes engaged, following advance guard forces may make a hasty attack. This attack is to breach the defender's position or reduce the defender's strength so movement can continue. The attacking force will use main battle tanks, infantry fighting vehicles, artillery, air defense artillery, and engineer units. Usually, the hasty attack is launched from the march. The attacking force *will not* wait for reinforcement from the main body as the enemy believes that a rapid attack with limited resources may find the defender without a completely organized defense. If the enemy's hasty attack is successful, the attacking elements will re-form into columns and continue to move.

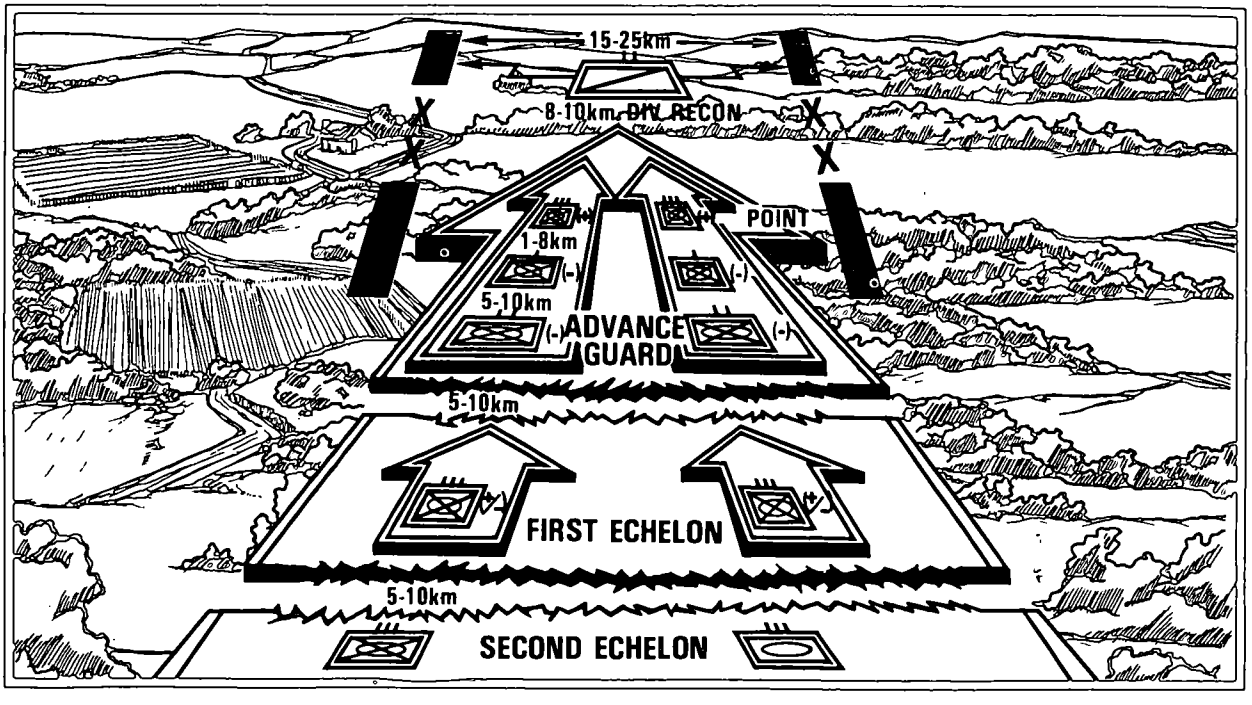
Following an unsuccessful hasty attack, the enemy division or army commander can—

- **Order his forces to assume a defensive posture.**
- **Divert his remaining forces toward another area.**
- **Order a breakthrough attack.**

ADVANCE GUARD OF A MOTORIZED RIFLE DIVISION



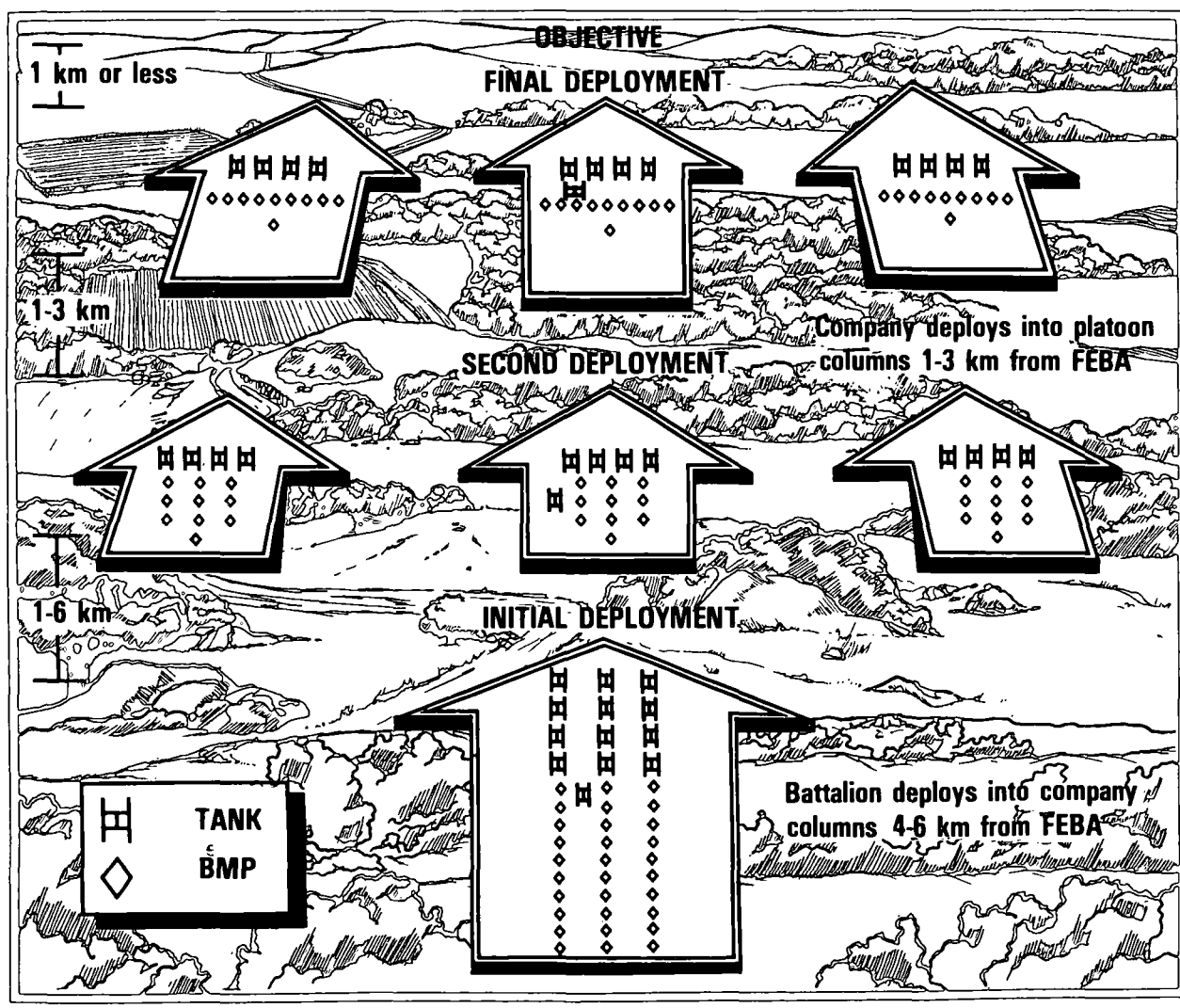
MOTORIZED RIFLE DIVISION ADVANCE TO CONTACT



Preparation for the enemy's breakthrough attack is detailed. Normally, planning for it begins before the movement to contact is started. Enemy doctrine is to position combined arms teams well forward and attempt to envelop rather than make a main assault. However, to the defender in the breakthrough area, this attack will appear as a main attack.

The enemy usually initiates a breakthrough with a massive artillery strike that can last 30 minutes or longer. Targets such as antitank weapons and artillery positions will be attacked continuously with indirect fires as the enemy maneuvers to exploit the fires. As the enemy closes on objectives, indirect fires will be shifted to other planned targets. Deep targets also will be attacked during the preparation, and aircraft may be used to extend these fires against targets beyond mortar, artillery, and rocket range.

MOTORIZED RIFLE BATTALION DEPLOYMENT FROM MARCH



If the breakthrough is successful, the enemy will re-form into column formation and move toward deep objectives. They will bypass pockets of resistance near initial defensive positions to maintain attack momentum and to reach the defender's rear area rapidly.

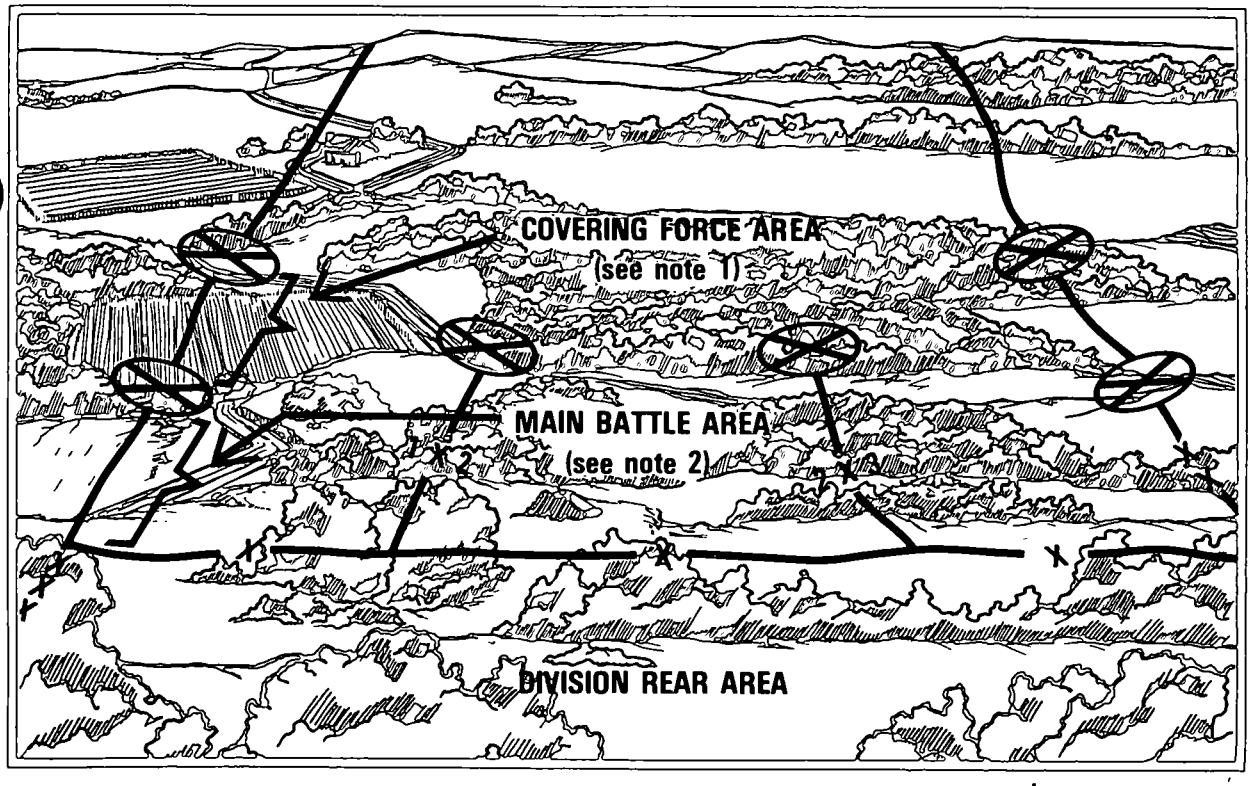
When a breakthrough attack does not rupture the defender's positions, the enemy commander can—

- **Commit more forces to relaunch or continue the attack.**
- **Attempt to fix a part of the defender's forces in some areas while continuing the attack in other areas.**
- **Launch an attack against a different area of the defense with large second echelon forces.**

Defensive maneuver and operations.

The defense is planned in as much detail as time and resources permit. Normally, the battlefield is organized into three areas as shown.

DEFENSIVE BATTLEFIELD ORGANIZATION



Notes. 1. When the division begins the defense with forces in contact, a covering force area (CFA) normally will not be established; forward brigades, however, will establish security as required.

2. Depiction of three brigades in the main battle area (MBA) is for illustrative purposes. The actual number of brigade headquarters forward depends on the specific tactical situation.

Covering force area. The CFA begins along the line of contact and extends rearward to the forward edge of the main battle area. The mission of the covering force is to find the enemy and fight him with sufficient force to cause him to deploy, plan an attack, and concentrate forces to attack and thus reveal the location and direction of his main effort. This must be done sufficiently far forward to permit forces in the main battle area to concentrate forces to destroy the enemy main effort. To do this, the covering force must strip away enemy reconnaissance units, defeat the advance guard, force the enemy to deploy his main body, defeat hasty attacks by the main body, and cause the enemy to bring up artillery and second echelon forces to organize a deliberate attack. As the enemy shifts forces, brings up artillery, and masses for a main attack, he will reveal his strength and plan of attack. The covering force may have to attack vigorously to destroy reconnaissance or advance guard elements or to divert the enemy pressure from one area to another, thus dissipating mass and moderating momentum. A covering force also seeks to keep from the enemy the actual location of the main battle area; to do this, the covering force may have to fight forward of the MBA until a specified time so that MBA preparations can be completed.

The covering force takes up the fight as far forward of the MBA as possible. Its battalions and squadrons fight from a series of coordinated, mutually supporting battle positions. Therefore, to units in the covering force itself the battle is very much like the action of any unit in an active defense, whether it be employed in the CFA or MBA. When directed to do so, the covering force hands off the enemy to MBA brigades, then moves to a designated area in the MBA, and prepares for operations there.

The covering force is normally tank heavy. A covering force operating in front of a division could well consist of up to four or five tank-heavy battalion task forces (TF) or cavalry squadrons, and attack helicopter, field artillery, air defense, and engineer units. The covering force may be controlled by either the division or corps. Provisions are made to change command arrangements in the course of battle as enemy strength and intentions are developed.

Main battle area. The decisive battle is fought in the main battle area where forces are concentrated to destroy the enemy main attack. As a result of concentration, forces will usually be unequally distributed laterally. Thus, there will be differences in the way combat forces fight the defensive battle, depending upon whether they are in the area where forces are concentrated or in the area where forces are economized. Since the defender cannot be strong everywhere, some risks must be taken. This is particularly true when forces are moved to concentrate against the main enemy effort. Less threatened areas are covered by air and ground cavalry, attack helicopter units, or by battalion task forces operating over wider areas. In the main battle area, tank-heavy task forces are concentrated in depth along the major avenues of approach into the area to be defended. However, some main battle area brigades can expect to be

organized initially with mechanized infantry-heavy task forces in situations where a strong covering force is established. Task forces from the covering force join the fight in the MBA when they become available.

When the division commander has determined where he intends to employ his forces, brigades are designated to control battalions defending in the main battle area. The division commander designates areas in which brigade commanders are expected to fight their forces.

Battle positions are selected for occupation by units as large as a battalion task force and as small as a platoon. Brigade and battalion commanders direct the fight by specifying which battle position their units will occupy and what they will do there—defend, support, attack by fire, or block.

Battle positions are occupied, vacated, and reoccupied as the battle develops. The division commander and his brigade commanders plan the maneuver of battalion task forces from one battle position to several others. When the battle commences, forces can be concentrated quickly and can be redirected equally quickly to another area of concentration.

Strongpoints. In some cases, division or brigade commanders may direct that a strongpoint be emplaced by a mechanized unit—usually a battalion. The strongpoint is essentially an antitank "nest" that cannot be overrun quickly or bypassed by tanks. It can be reduced by enemy infantry only with the expenditure of much time and overwhelming forces. A strongpoint is located on a terrain feature critical to the defense or one that must be denied to the enemy. It is the cork in a bottleneck formed by terrain, obstacles, and units. It is developed to defeat an attack from any direction.

Counterattack. Offensive action is necessary to gain the initiative, maintain the continuity of the defense, and to reposition forces to defeat following enemy echelons. The defender should counterattack whenever there is an opportunity to destroy enemy units. A counterattack may be conducted by division, brigade, or battalion. Counterattacks are planned in great detail, but—like hasty attacks—are executed rapidly. In any event, it is necessary to concentrate sufficient combat power to destroy the enemy force, as some of the defender's inherent advantages are forfeited when he becomes the attacker.

Reserve. The traditional concept of one element being held in reserve for every two elements committed is a luxury not available to the outnumbered defender. He must commit as much of his combat power to the battle as soon as possible in order to destroy the enemy rapidly. His "reserve" consists of mobile units, not heavily engaged, that can be concentrated where the enemy main attack occurs. These forces are generally deployed in depth along major avenues of approach. Their *inherent* mobility enables the commander to rapidly concentrate them by lateral movement in critical areas of the battlefield. It is imperative that the enemy's main thrust be fixed accurately because forces that are concentrated to meet it leave other sectors of the MBA lightly defended.

Rear area. Divisions will control the area and forces behind brigades. The division main command post and supporting units not located in the MBA normally are located in the division rear. Since units in reserve will usually be committed to the fight in the MBA by placing them under the operational control of brigades, they usually will be located in the MBA from the outset.

THE CANNON BATTALION IN DEFENSIVE OPERATIONS

The brigade commander conducting defensive operations will expect his supporting field artillery to—

- Disorganize, delay, and weaken the enemy before he attacks.
- Strike him as he attacks to strip away his air defense and reconnaissance.
- Slow him down, cause his tanks to button up, and suppress his direct fire weapons.
- Counterfire to suppress or neutralize his indirect fire support.
- Mass fires on attacking elements in the main battle area.
- Fire beyond the MBA to weaken second echelon battalion.

The remainder of this chapter tells how the cannon battalion accomplishes defensive operations in terms of the 10 basic tasks discussed in chapter 1.

Covering force.

Covering forces slow, delay, and wear down the enemy. They exert sufficient pressure to cause the enemy to form for a breakthrough attack. Forces in the covering force area must make the enemy reveal the location of his main thrust.

FM 6-20

Target acquisition. Target acquisition elements positioned in the covering force area must be included in the battalion's plan for repositioning. Weapon locating radars require approximately 15 minutes to prepare for displacement after the order to displace is given. If a cannon battalion has an attached WLR, the S3 will order its displacement. When possible, the WLR should be located close to one of the firing batteries. When the enemy situation dictates displacement of the battery, it is also time to displace the weapon locating radar. New locations for the WLR are recommended by the S2. These locations should be oriented on the area of the enemy's main effort as it develops because that is where he will concentrate his indirect fire support. Weapon locating radars and sound/flash bases require survey control.

Meteorology, survey, and registration. Cannon battalions supporting covering force operations coordinate with the force artillery headquarters to insure that meteorology support is available. Division artillery (or the field artillery brigade designated as force artillery headquarters for the covering force) will establish forward met stations in the covering force area. The cannon battalion S3 must insure that communications are established and maintained with the met station. Sufficient time should be available to establish formal survey in initial positions; however, subsequent positions may receive hasty survey, especially if moves become rapid and frequent. Priority for survey will be to firing battery positions and target acquisition assets in that order. If registrations are required, they are fired to the rear or to the right or left of the primary azimuth of fire or from offset positions. If mets are valid and calibration is current, met + VE is used in lieu of registrations.

Tactical fire control. In addition to reinforcing field artillery, cannon battalions in direct support of covering force elements normally receive augmenting fires from MBA field artillery battalions. The locations of MBA units must be kept current and plotted on charts and overlays to facilitate the fire direction officer's decision on when and where to employ their fires. When engaging tanks with field artillery, the FDO should select available shell/fuze combinations that will cause enemy tanks to slow down and button up, increasing their vulnerability to engagement and destruction by the covering force's antitank capability. Cross attachment of field artillery batteries is common when organizing for covering force operations. A direct support battalion may have an 8-inch battery attached. *Remember,* 8-inch batteries have no smoke or illumination capability.

Fire planning. Initial targeting information will be sketchy and consist primarily of fires planned on likely

approach routes beyond the supported force's direct fire range. As the battle develops and targeting information becomes more exacting, the fire planning effort will focus on:

- **Fires on the approaching enemy to slow his advance.**
- **Fires to assist the disengagement and repositioning of friendly maneuver elements.**
- **Fires on enemy penetrations.**

The task force FSO submits targets based on his knowledge of friendly elements in relation to the approaching enemy force and the location and capabilities of available field artillery.

Plans and orders. Because of wide frontages in the covering force, it will not be uncommon for cannon battalions to be in direct support of battalion-size task forces. When this occurs, the direct support battalion commander becomes the fire support coordinator for the maneuver battalion and the battalion FSO becomes the assistant FSCOORD. To aid deception, cross attachment of field artillery batteries will be common. This provides for calibers across the covering force front representative of what the enemy would expect to find when confronted by US armor/mechanized divisions.

Positioning/displacement. Field artillery units should be positioned initially far enough forward to be able to engage targets that can be acquired by target acquisition elements available to the supported force. The battalion commander, S3, S4, and reconnaissance/survey officer should look for routes and positions whenever possible. Primary and alternate positions must be selected and coordinated early so that survey and prestocking of ammunition can be accomplished. Selected positions and routes to those positions must be coordinated with the maneuver force in whose zone the routes and positions are located. When the covering force battle starts, the situation will develop rapidly. All units (maneuver and field artillery) must be prepared to displace quickly. The maneuver commander will be moving his forces based on the enemy situation as it develops and artillery must not interfere with the movement of maneuver forces. If terrain permits, cross-country moves rather than road moves should be planned to avoid any refugee congestion along roads and highways.

Reconnaissance. Field artillery positions should be selected away from enemy high-speed avenues of approach and should provide adequate cover and concealment. Position locations that can present the enemy with long range fields of fire into the position are avoided. Reconnaissance for subsequent positions is continuous and is by ground reconnaissance where possible or by a combined map and air reconnaissance when air elements are available and time precludes a ground reconnaissance.

Careful planning and timely execution of displacement must be done to insure continuous support for the maneuver force.

Communications. When the covering force battle begins, wire will give way to FM radio as the primary means of communication. FM nets should be opened selectively based on the volume of radio traffic. Wire communications should be established between the field artillery battalion and the task force FSOs whenever possible. This will significantly reduce the amount of FM traffic and will facilitate the passage of long messages; e.g., target lists, maneuver control measures, and situation reports. Communication links should be established between covering force battalions.

Combat service support. Consideration should be given to centralizing all ammunition sections under the operational control of the battalion ammunition officer. This provides a high degree of control and the maximum amount of flexibility in terms of resupply operations. It also enables the ammunition officer to concentrate support to priority units. As the covering force battle develops and battery moves increase, special efforts will be required to keep individual truckdrivers aware of changing battery locations.

Main battle area.

> **The bulk of the defending force is deployed in the main battle area, since this is the area the defender chose for decisive battle to defeat the enemy. Forces in the MBA are prepared to concentrate to defeat the enemy's main effort.**
>
> **FM 6-20**

The cannon battalion, as part of the MBA defense, has many advantages: use of covered and concealed positions, survey to allow for massed fires, and battery position areas hardened and prepared in depth. The enemy must expose his force to our artillery fires while moving, fight on the terrain that the defender has prepared, and try to destroy or suppress hardened positions that take full advantage of available cover. Following are key considerations that apply to cannon battalion operations in support of MBA forces.

Target acquisition. Field artillery target acquisition elements should be oriented on the enemy's main effort, since that is where the enemy can be expected to concentrate his indirect fire support. Weapon locating radars should be positioned approximately 5-7 kilometers behind the forward edge of the battle area to increase lateral coverage at, and immediately forward of, the FEBA. Sound/flash bases (if available to

the cannon battalion) should be positioned with their bases oriented on the enemy's main thrust. A sound/flash base covers approximately a 10-kilometer front and should be positioned to complement coverage provided by weapon locating radars. As the MBA forces are repositioned, target acquisition elements should also be repositioned. The S2 and S3 must monitor the developing battle jointly to avoid a situation that necessitates simultaneous displacement of all available target acquisition resources. Displacement should be staggered so that some coverage is always available.

Fire planning. The critical fire planning task initially will be to support the passage of covering force elements into the main battle area. Fire support officers with covering force elements will be submitting planned targets along predesignated passage routes. The FSO knows the locations of the passing elements, and he will control the planned fires in support of these elements. Covering force elements *do not* break contact after change of control is implemented. They continue to fight as they reposition into the MBA and will require immediately responsive fire support. DS cannon battalions supporting MBA brigades will be responsible for providing planned and immediate field artillery support to covering force elements repositioning into the supported brigade's zone.

If defensive targets are to be fired when the enemy attacks into the MBA, targeting information should be requested from FSOs with covering force elements regarding:

- **Enemy forward elements.**
- **Indirect fire weapon systems and command observation posts.**
- **Command posts, communication facilities, and reserves.**

Since covering force units have been in contact with the enemy throughout the covering force fight, they can provide valuable targeting information to MBA forces.

Positioning/displacement. Normally, MBA field artillery units will initially be positioned in supplemental positions *forward* of the main battle area to provide additional field artillery support to the covering force.

Positions should be selected that—

- **Are far enough forward to range beyond the covering force's initial positions.**
- **Are along routes that facilitate displacement into the MBA.**
- **Provide good cover and concealment to minimize vulnerability to enemy air attack.**

The cannon battalion DS to the MBA brigade positioned in front of the enemy main effort may have to be positioned

outside the brigade area to avoid the path of the enemy main effort. The position selected must be coordinated with the maneuver commander who "owns the terrain." This is best accomplished by contacting the cannon battalion DS to the brigade and requesting that battalion to make the necessary coordination. The division artillery command/intelligence net (FM, secure) can be used because both DS battalions are on that net.

Displacement should be planned to provide maximum cannon units in position and ready to fire at all times. Main battle area field artillery should be echeloned in depth, and displacement should be by battery whenever possible. Displacement is coordinated with reinforcing field artillery to avoid, as much as possible, simultaneous displacement of DS and reinforcing fire units.

Communications. Maximum use is made of wire in the main battle area. As soon as MBA locations are determined, the wire laying effort should begin. The communications-electronics staff officer should be informed of new positions as soon as they are selected so that wire teams can be dispatched to the new locations and begin the wire laying effort *prior* to displacement. Moves will be less frequent in the MBA than in the covering force, and every effort should be made to maximize wire communications. Wire should be dug-in or overheaded as time permits.

Communications must be established between the MBA DS battalions and the fire support teams and fire support officers of the task forces with the covering force to be positioned in the brigade battle areas prior to change of control. This is best accomplished by having the MBA DS battalion monitor the frequencies being used by the FISTs/FSOs at the time change of control occurs. FISTs/FSOs continue to use the same frequencies, and MBA DS cannon battalions will answer calls for fire on these frequencies until all covering force elements being supported have withdrawn into the main battle area. Advantages of handling communications in this manner at change of control are:

- **It precludes covering force FISTs/FSOs from having to change frequencies at this critical time.**
- **It precludes issuing additional Communications-Electronics Operation Instructions (CEOI) extracts to FISTs/FSOs in the covering force and reduces the possibility of CEOI compromise.**
- **It precludes early use of MBA FM nets and possible detection by enemy jammers prior to the MBA fight.**

FM nets should be opened selectively, and only when the volume of *necessary* FM traffic dictates. As the MBA fight develops and the demand for close support fires increases, it may be necessary to establish quick-fire channels direct from FISTs to the reinforcing field artillery battalion.

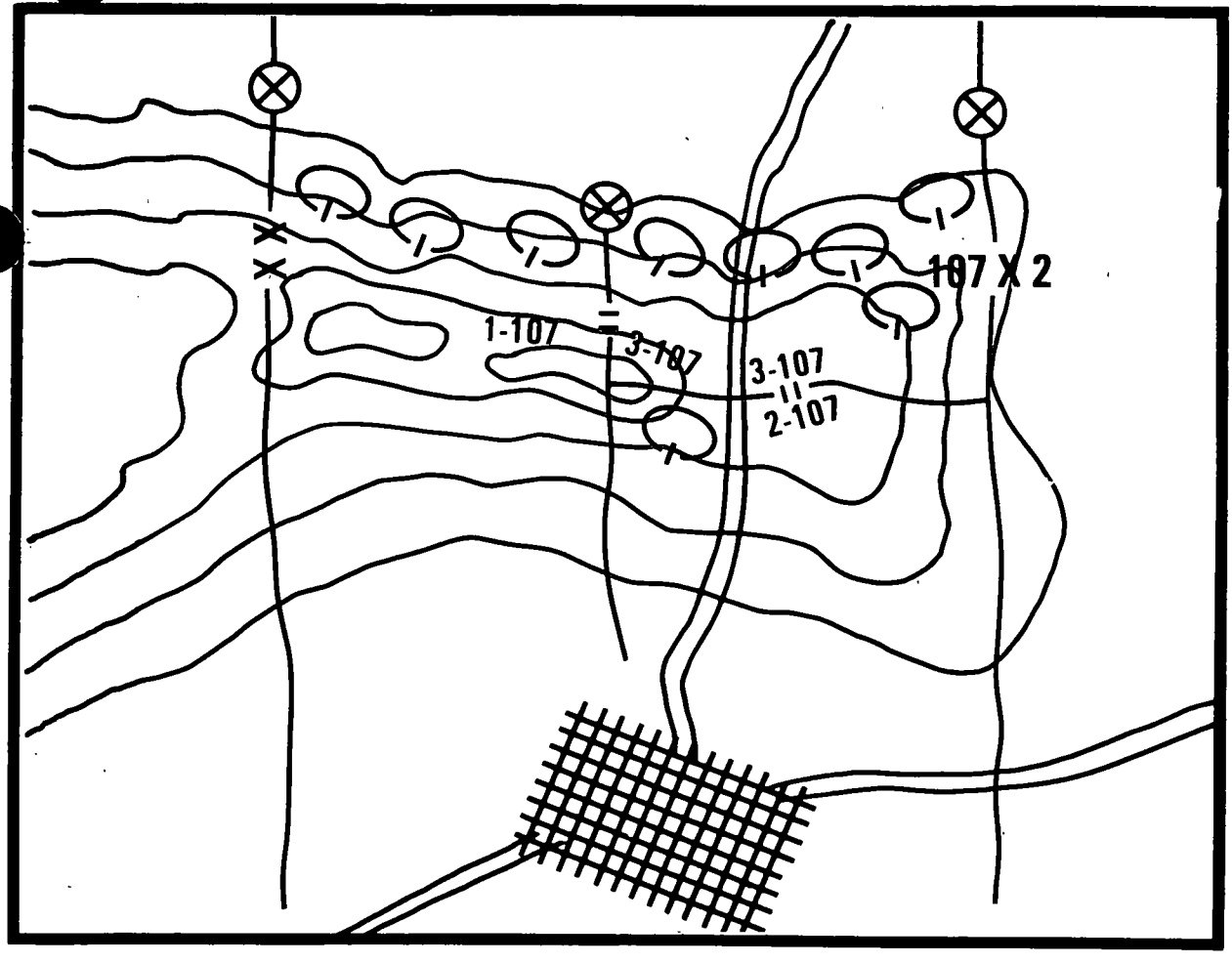
Combat service support. The availability and resupply of class V will be critical because of the heavy expenditures anticipated during the MBA fight. If an unusually large expenditure of ammunition can be predicted, the S3 should consider ammunition for immediate expenditure. (Chapter 5 explains the implications of ammunition for immediate expenditure.) The S3 must keep the battalion ammunition officer aware of the class V status of the fire units. All ammunition sections should be centralized under the ammunition officer's control. This enables him to concentrate the resupply effort to fire units that are experiencing extremely high volumes of fire *or* are becoming critically short of ammunition. If a fire unit is running dangerously low on class V and if the battalion cannot resupply the unit immediately, the S3 should consider shifting class V from an adjacent fire unit. If a battery runs out of class V, the S3 should shift immediately its critical planned targets to another fire unit in range and reposition field artillery units as necessary to cover the battery's zone. These actions should be accomplished *before the fact* if the S3 can predict with any degree of certainty that a fire unit will run out of class V before it can be resupplied.

Supporting light infantry in the MBA.

While armored and mechanized forces conduct an active defense, infantry forces conduct a position defense by concentrating forces along likely enemy avenues of approach before the battle begins. Infantry may organize the main battle area in two ways.

The linear position defense emphasizes interlocking and overlapping observation and fields of fire along the FEBA to preclude penetration or loss of specific terrain. Forces are employed well forward in prepared positions to stop enemy forces as far forward of the FEBA as possible. Small reserves reinforce, thicken the defense, block penetrations, or conduct small counterattacks to regain terrain.

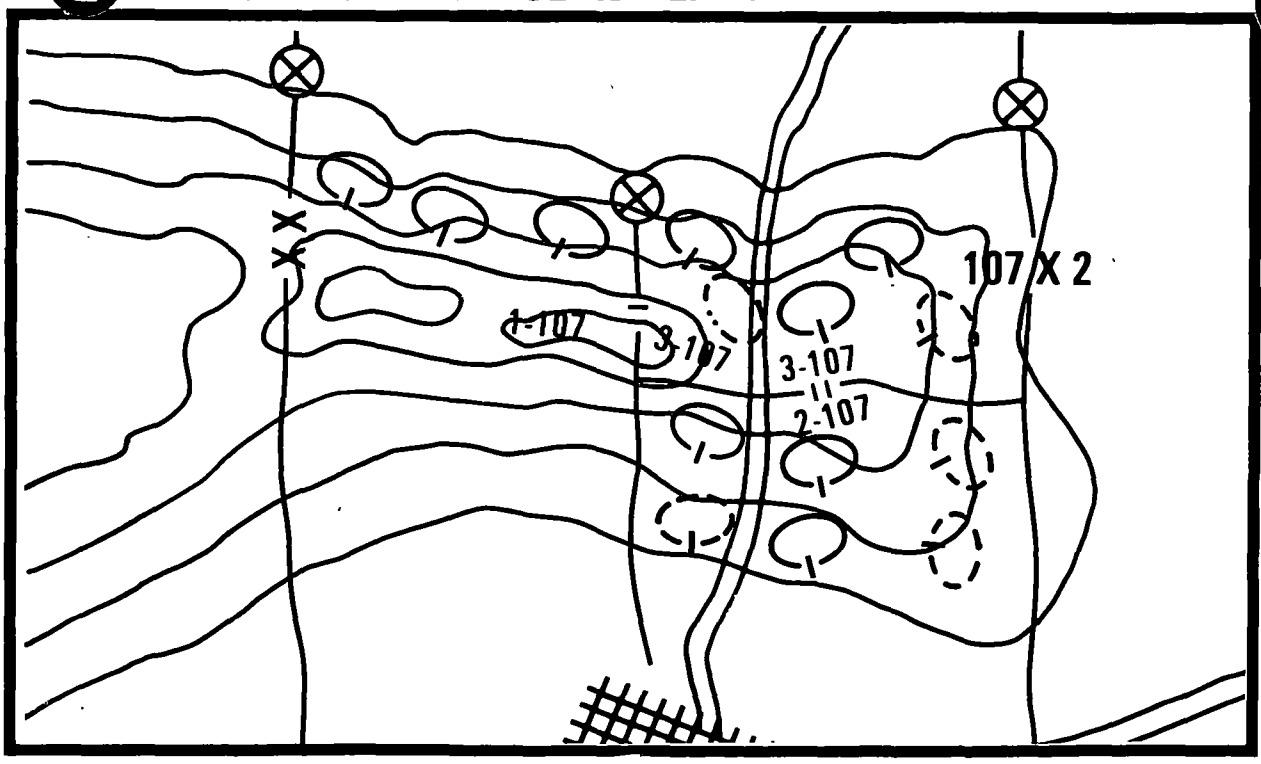
1 A LINEAR POSITION DEFENSE



The position defense in depth contains a series of mutually supporting battle positions arrayed in depth with forces remaining in position except for local or internal movement. Depth is derived from initial positioning—not maneuver. Infantry may employ mounted or dismounted security forces forward of the main battle area.

Considerations for supporting light infantry in the MBA are essentially the same as those discussed previously for supporting armor/mechanized forces in the MBA.

2 A POSITION DEFENSE IN DEPTH



ADDITIONAL PLANNING CONSIDERATIONS FOR SUPPORTING LIGHT INFANTRY

- **Organic 105-mm (towed) howitzers have less range and fewer ammunition options (no nuclear capability or dual purpose improved conventional munitions).**
- **Massed fires are critical to canalize the enemy and reduce his mobility to the level of the defender.**
- **Close defensive fires are more common because units reposition less frequently.**
- **Counterfire becomes more critical due to less armor protection for friendly forces.**
- **Selection of firing battery position areas should take into account the limited cross-country capability of the 105-mm (towed) howitzer.**

Delay and withdrawal operations.

Concept of the delay. Normally, delay operations are conducted when there are insufficient forces to attack or defend, making it necessary to trade space for time. Delay operations are conducted much like the active defense, except that, while the purpose of the defense is to STOP the enemy, the purpose of the delay is to SLOW the enemy, often for a specified time. When a force is delaying, some of its subordinate units may be counterattacking, some defending, and some disengaging to move to other positions. Delay operations are conducted to force the enemy to take the time to concentrate, again and again, against successive battle positions to overcome each in turn. Just when the enemy has everything organized, when his artillery is starting to fire, and his ground units are starting to maneuver, the delaying force moves to its next set of battle positions. The enemy must then go through the same time-consuming process once again.

Concept of the withdrawal. A withdrawal is an operation in which all or part of the force disengages from the enemy. Its purpose is to move a force out of an area in order to employ it elsewhere. The *timing* of the decision to disengage is critical; made too late, the decision could be impossible to execute. In some cases, it might be less dangerous to fight an action to its conclusion than to break contact to fight elsewhere. In other cases, it may be necessary for part of the force to attack to allow the remainder to disengage. In disengaging from the enemy, it is most important to put distance between the disengaging force and the enemy as quickly as possible, preferably without the enemy knowing about it. Disengagement and withdrawal are best accomplished under cover of darkness, or during other periods of limited visibility, even though command control may be more difficult.

Considerations for cannon battalions supporting delay and withdrawal operations. Field artillery support for delay and withdrawal operations is similar to support for the active defense. Additionally, the following considerations apply:

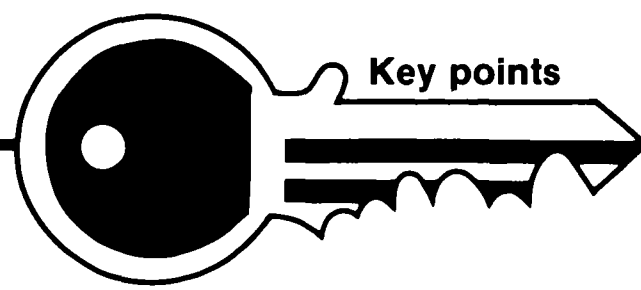
Positioning and movement. In delay and withdrawal operations, artillery should be *positioned in depth* and *moved by battery or echelon* to provide maximum continuous fire. Field artillery supporting a force in a delay will displace as necessary to provide these fires. In

withdrawal, GS units will usually move early, before the maneuver units, and DS and reinforcing units will move with their supported forces. As maneuver forces displace, field artillery units stay in range of the forces in contact.

Survey. Survey should not present a problem during retrograde operations because units will probably be covering the same terrain they have been over previously. Survey control may already be established, and it may only be necessary to extend it where needed, time permitting.

Combat service support. Resupply may become a serious problem, particularly with respect to ammunition and POL. In all probability, ammunition will have to be hauled from ammunition supply points (ASP) in the rear of the main force all the way forward. It may be possible to pre-position some ammunition in reserve, but this should not be done if there is any threat of deep enemy penetration. If distances are great and road networks are inadequate, mobile ASPs should be established. Field artillery units will be displacing frequently and will require a large amount of fuel. Planners must keep this in mind and will request additional tank trucks and other POL support when required. Enemy advances may require the abandonment of nonoperational equipment. Unit personnel must be well trained in destruction procedures and prepared to destroy in place any equipment that cannot be evacuated.

Appendix F contains scenarios that illustrate cannon battalion support of defensive operations within the framework of a tactical situation.



Key points

- **Plan fires to disorganize, delay, and weaken the enemy before he forms to attack.**
- **Strip away enemy air defense and reconnaissance.**
- **Keep enemy tanks buttoned up.**
- **Suppress enemy direct and indirect fire weapons.**
- **Mass fires on attacking enemy in the MBA.**
- **Plan fires for economy of force areas.**

CHAPTER 4:

Operations Security

This chapter tells the cannon battalion commander and staff how to apply operations security measures in combat.

The enemy has a sophisticated all-source intelligence system. That system includes resources that can monitor communications, can locate all types of emitters, can control agents located deep in rear areas, and can see the battlefield from overhead. To survive and function in this environment, the cannon battalion commander and his staff must understand the enemy intelligence system and how to plan for and use OPSEC measures and countermeasures.

Enemy intelligence.

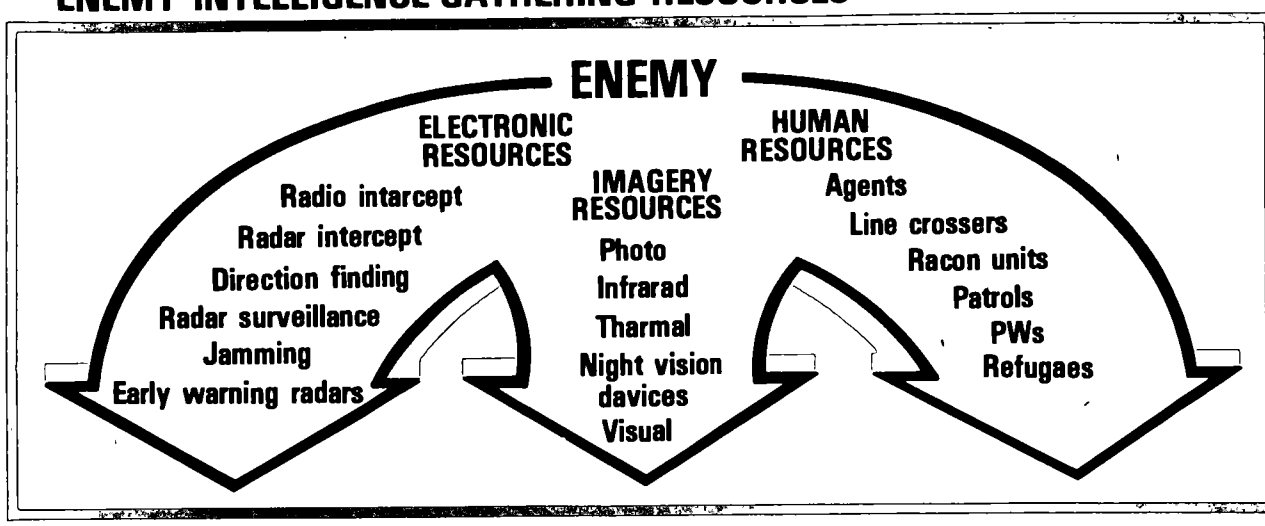
The enemy has intelligence-gathering resources that fit into three distinct categories:

- **Electromagnetic intelligence from emitters.**
- **Imagery from overhead platforms.**
- **Human intelligence from agents and direct observation.**

Electromagnetic intelligence. Electromagnetic intelligence is the enemy's primary means of collecting tactical intelligence. This intelligence is derived from electronic detection and exploiting emissions from communication equipment, radar, and navigational aids. Enemy electromagnetic intelligence is generally timely and has a 24-hour, all-weather capability. Its resources are generally limited in their ability to identify, classify, and locate possible artillery targets accurately. They are vulnerable to deception and jamming.

Imagery intelligence. Imagery intelligence is derived primarily from thermal, infrared (IR), and photographic sensors carried by overhead platforms. The enemy's imagery data can be the most accurate for producing intelligence, but it is limited by weather and countermeasures. It frequently lacks timeliness, and thus it is used primarily to confirm what may have been discovered initially by other intelligence means.

ENEMY INTELLIGENCE-GATHERING RESOURCES



Human intelligence. Human intelligence (HUMINT) includes directly observing enemy forces; studying reports from agents; exploiting prisoners; analyzing documents, equipment, and waste left by enemy units; employing long-range patrols; establishing listening and observation posts; interfacing with local military or paramilitary forces; and—most important—analyzing reports from frontline troops.

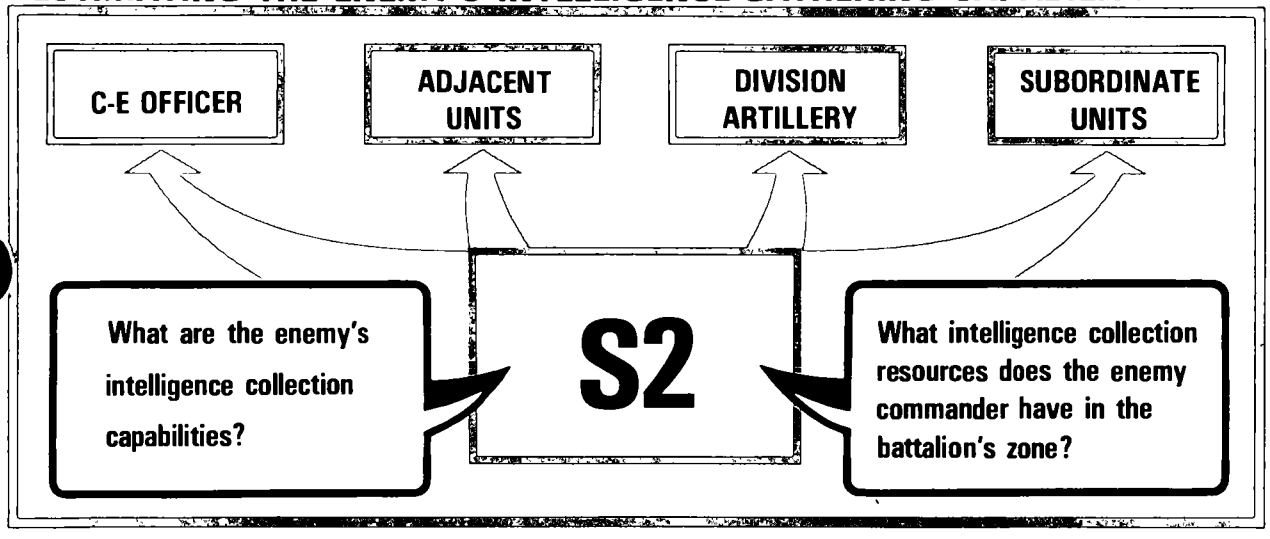
OPSEC planning.

Not all enemy intelligence-gathering resources mentioned will be available to the enemy all the time. Therefore, the extent to which OPSEC is used depends largely on the enemy's intelligence-gathering capability in the area. To tie OPSEC and the enemy's intelligence capability together, the battalion

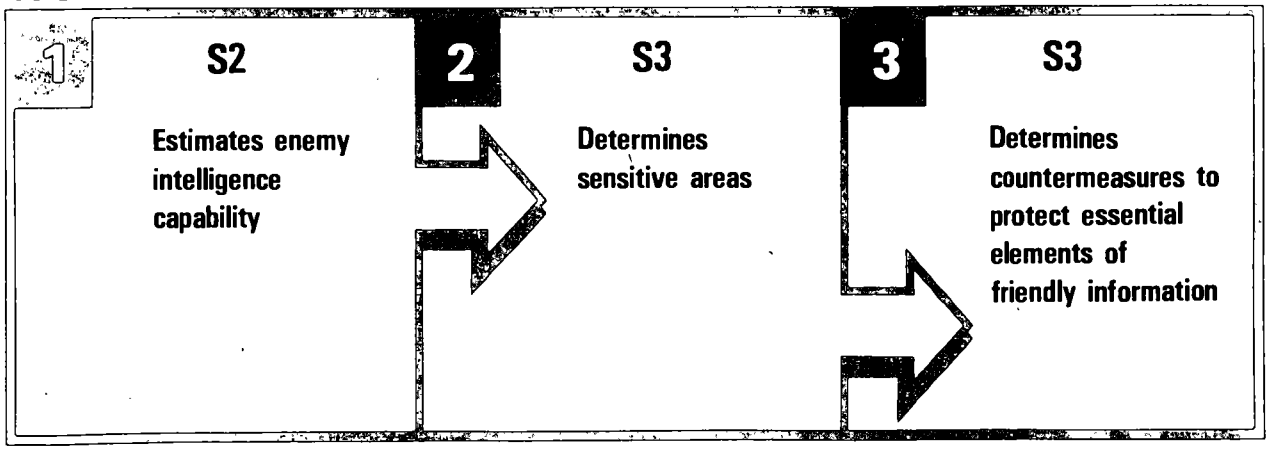
operations/intelligence section must first analyze the battalion's OPSEC vulnerabilities, decide on countermeasures, and then review the effectiveness of measures taken.

Enemy capabilities. The first step in OPSEC planning is to estimate the enemy's intelligence-gathering capability. The S2 does this by coordinating with other units and agencies.

ESTIMATING THE ENEMY'S INTELLIGENCE-GATHERING CAPABILITY



OPSEC RESPONSIBILITIES IN ANALYSIS



Sensitive areas. The second step in OPSEC planning is to determine the sensitive aspects of the operation. The S3 does this with information provided by all other battalion staff officers. He must answer the question: "If known by the enemy, *what information* and *what staff actions in what time frame* can compromise the operation?" These sensitive aspects, which must be kept from the enemy to make the operation successful, are called essential elements of friendly information (EEFI).

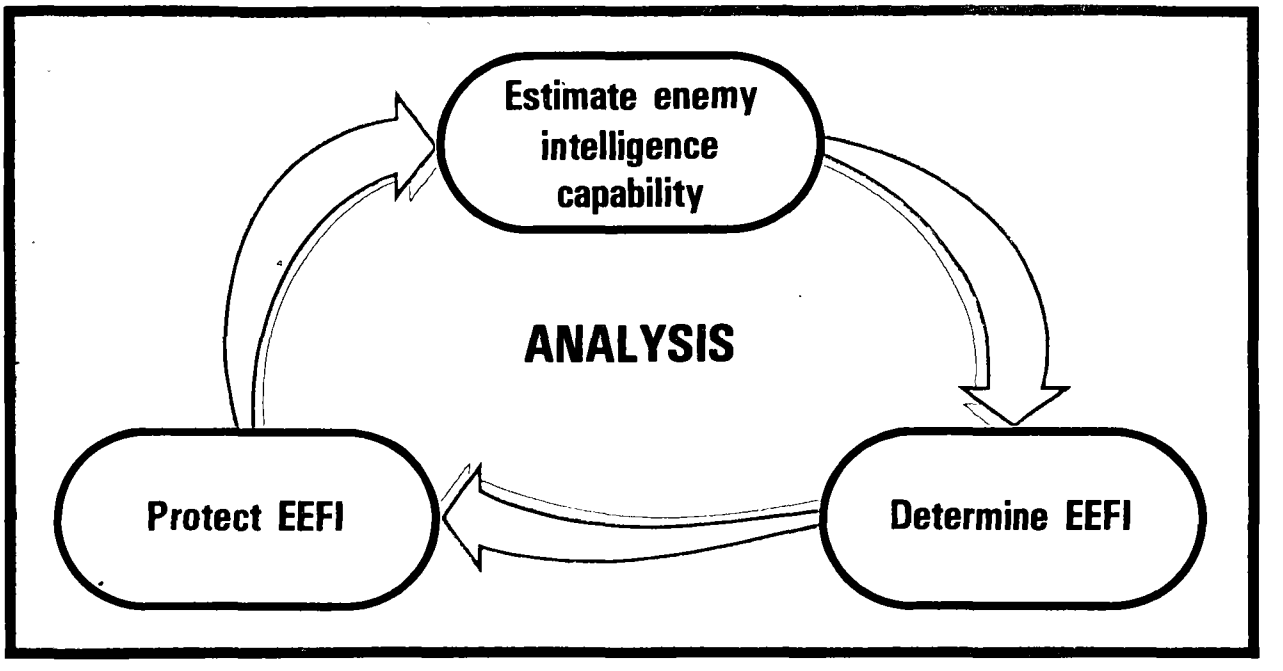
EEFI is gathered by enemy intelligence from indicators—*signatures, profiles,* and *patterns.* Individually, they may not be conclusive, but collectively they may provide the enemy with a good indication of US intentions and order of battle.

EXAMPLES OF EEFI

Information	Staff Actions
Friendly force plans. Ammunition resupply rate. Attached or reinforcing artillery. Disposition of our forces on the line of contact. Proposed battery and battalion locations. Time operation will commence.	Requests for replacements. Cannibalization of vehicles. Movement of CSS elements. Significant changes in radio traffic.

EXAMPLES OF INTELLIGENCE INDICATORS

Signatures	Profiles	Patterns
Come from unit presence.	Come from unit activity.	Come from doing things the same way.
Moving target locating radars indicate division artillery level unit. Flashes and booms that do not move may indicate an artillery unit. Two or more M577s together indicate a possible tactical operations center. Diesel smells mixed with cordite indicate a firing unit.	Moving combat service support forward indicates attack. Two met balloons in one area indicate possibly two div arty type headquarters. Sudden increase in radio traffic indicates possible displacement. Three-round high explosive spotting (HES) registration by an 8-inch unit indicates a possible nuclear mission.	Artillery is always located in a tree line. Radars or retrans are located on reverse slope of highest hill. Increased commo usage before each move, then lapsing into listening silence indicates movement to contact.

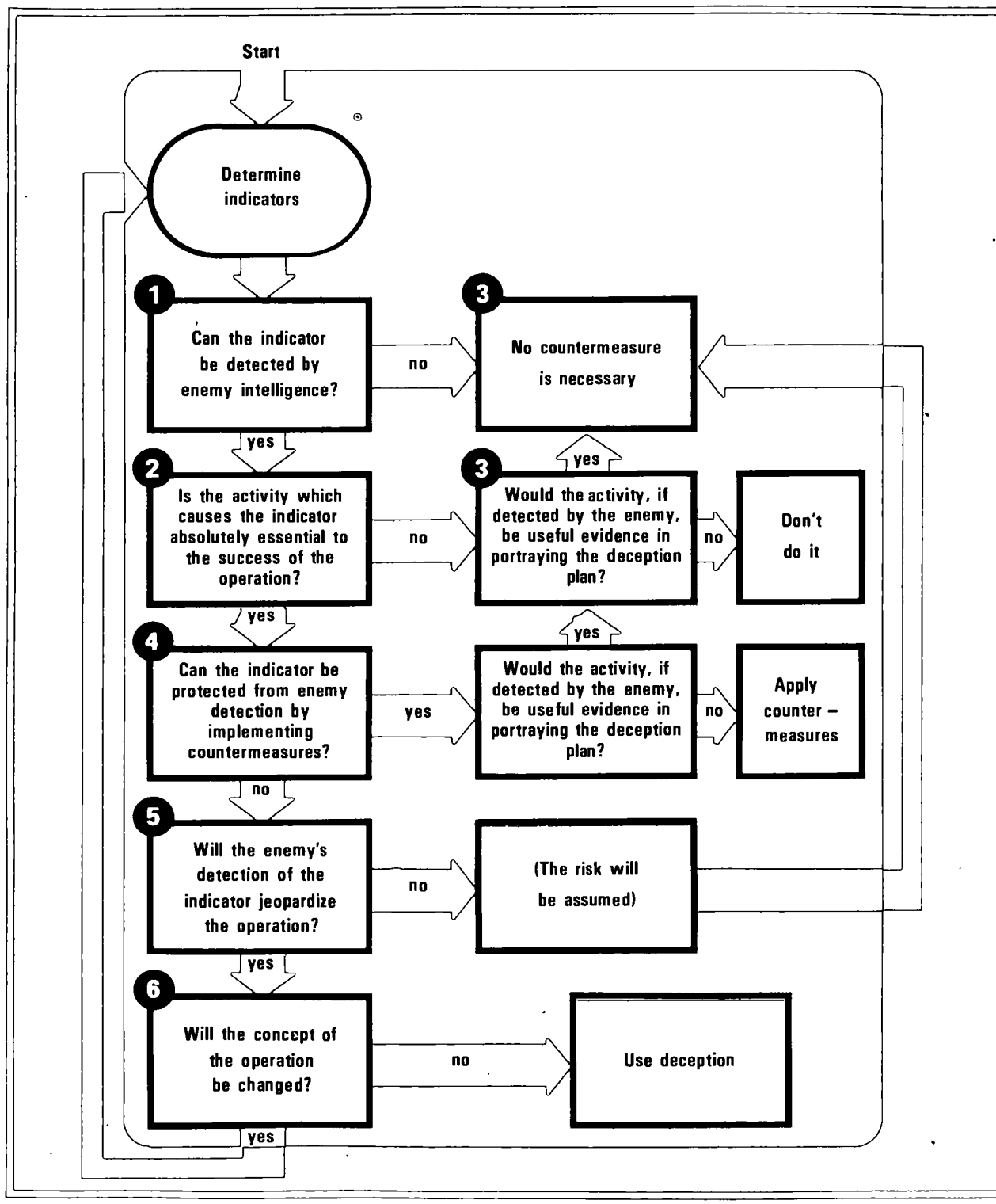


When enemy intelligence capability and EEFI have been determined, the next step is to determine how the EEFI can be protected. The S3 does this by planning countermeasures for the enemy intelligence-gathering capability in zone.

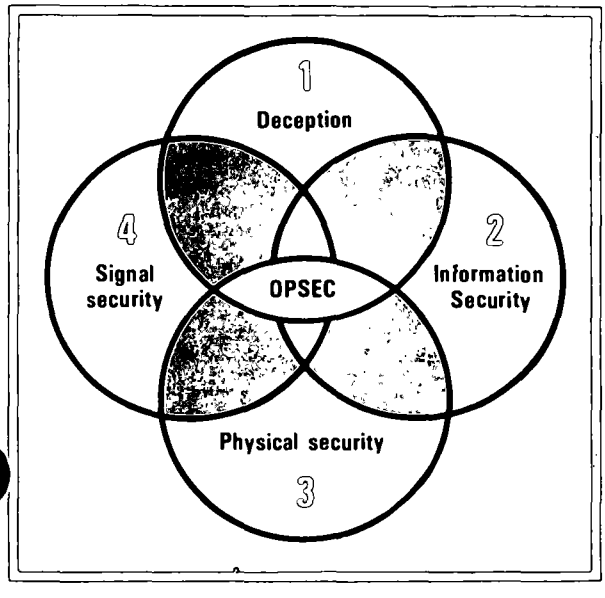
OPSEC countermeasures.

The S3 determines if countermeasures will be used, and if used, on which indicators. More than one countermeasure may be required to protect an indicator, because there may be more than one way for the enemy to detect the indicator. Not all indicators require protection, but they contribute to the operation by enhancing the deception plan. For example, communications may be increased to cause the enemy to believe an attack will be launched in an area away from where the attack will really take place.

COUNTERMEASURES DECISION PROCESS



OPSEC countermeasures are derived from the four main parts of OPSEC: ***deception, information security, physical security,*** and ***signal security (SIGSEC).*** All are interrelated and must be considered simultaneously for each operation when applying countermeasures.



1

Deception. Deception is that part of the OPSEC aimed at misleading the enemy about current or intended operations. Deception also includes measures that prevent the enemy from spotting a pattern of actions. It is used to confuse the enemy when actions by units could obviously provide information about their intentions.

Patterns come from doing things the same way they have always been done. They are usually part of standing operating procedures or what is considered standard doctrine. Although an SOP establishes order to routine operations, it may lead to patterns that may cause needless casualties; therefore, patterns must be disguised to preclude their exploitation by the enemy.

Division or corps formulates deception plans. The responsibility to execute a part of the plan may be given to the division artillery and its subordinate units. The division artillery staff will give guidance to the cannon battalion commander about what deceptive measures will be used. This guidance is integrated into the unit's EEFI. Within the framework of this guidance, the S3 decides which deceptive countermeasures must be used. However, any execution of the deception countermeasures must be closely coordinated with maneuver operations. Without this coordination we might, for example, dispense smoke in our area and blind a friendly tank unit that is overwatching other maneuver units.

Examples of deceptive countermeasures:

Camouflage—hide equipment so the enemy *cannot* detect it, or establish camouflage where the enemy *can* detect it that misleads him regarding unit locations.

Decoy equipment—make the enemy believe units or positions exist that in fact do not.

Smoke—obscure more areas than are necessary for the operation to confuse the enemy about where, for example, river crossings will be made.

Fake positions—make the enemy believe units are being positioned in an area that is not where the operation will be executed.

Offset firing positions—move guns or batteries away from primary positions to

prevent the enemy from locating the positions and to confuse the enemy regarding how much field artillery is in the operational area.

Roving guns—confuse the enemy regarding primary weapon locations and how much artillery is available.

Split batteries—make the enemy believe there is more artillery available, thereby significantly increasing his target acquisition problem.

Unconventional positions—emplace batteries where the enemy *would not* expect them to be—for example, in the open or on forward slopes. The enemy expects the field artillery to emplace in the trees and he will target likely position areas.

2

Information security. Information security prevents disclosing operational information through written, verbal, or graphic communications. Personnel should be warned that *unintentionally* releasing operational information and the contents of classified documents may compromise an operation. Information security should not be confused with EEFI. Those elements that make up EEFI come from more than written, verbal, and graphic communications.

Information security countermeasures are directed against human intelligence.

Examples of information security countermeasures:

Discuss operation planning only with those individuals who need to know and who are actually involved in the planning.

Emphasize subversion and espionage directed against the Army (SAEDA). All personnel must be aware of their responsibility to report conversations with people—military or civilian—who do not have a need to know, but who ask questions about the unit.

Enforce noise and light disipline to prevent direct observation.

Dispose of waste that would help the enemy develop order of battle information.

Brief the troops at the last possible moment regarding an operation. The tradeoff of increased security versus well informed troops must be considered in doing this. The commander must decide which is more important.

Do not permit CEOI information—frequencies and call signs—***to be written on windshields.***

3

Physical security. Physical security is protecting operational information or activities by using guards, barriers, and anti-intrusion devices. Its use limits or denies enemy access to facilities, areas, equipment, documents, and personnel. Countermeasures of this type are also aimed at enemy human intelligence.

Examples of physical security countermeasures:

Safes for classified documents.

Listening and observation posts to detect enemy activity before it can affect the battalion.

Patrols to gather information and detect enemy activity.
Guards to secure critical or sensitive installations, such as nuclear weapons.
Barriers to prevent enemy direct access into battery or battalion locations.
A challenge and password system to prevent unauthorized entry into position areas.
Foxholes and crew-served weapon positions—both howitzers and machineguns are fortified, so weapons can be used effectively if a position comes under direct attack.
Air and ground ***security for convoys.***
Small arms to defend against air attack.

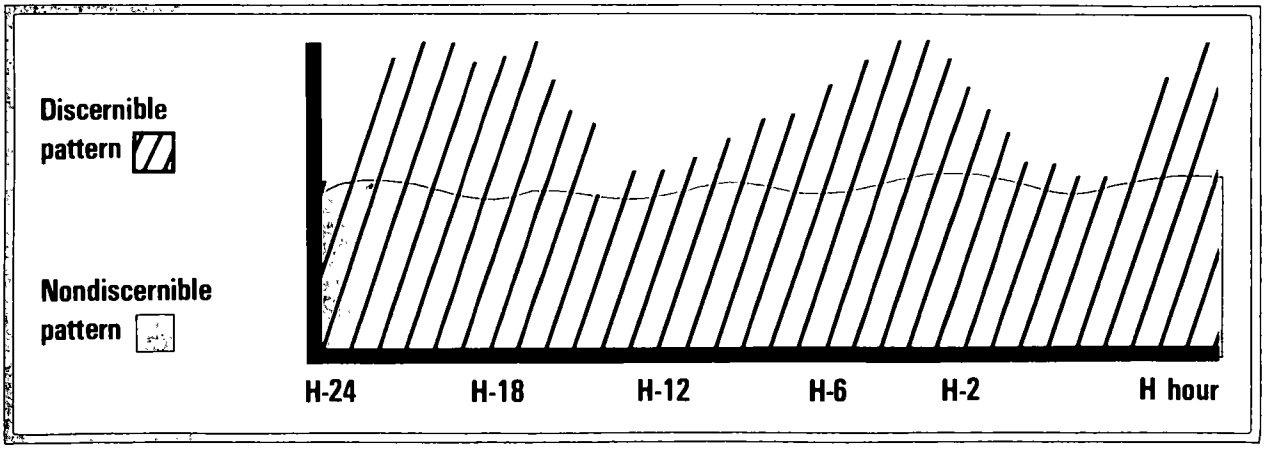
4

Signal security. Signal security is protecting operational information by using communications security (COMSEC) and electronic security (ELSEC) techniques. Communications security includes using authorized communication codes, secure voice equipment, listening silence, and proper radiotelephone procedures. Electronic security is protecting noncommunications emitters by actions such as proper radar positioning and antenna siting.

Field artillery electronic signatures and profiles come largely from violating signal security and from poor planning. For example, if before every attack the volume of communication changes significantly due to administrative, logistical, and operational support conversations, a discernible pattern can be charted as shown below.

With analysis, the enemy can predict that there will be an attack 12 to 15 hours after a dramatic increase in communications volume or 2 hours after the initiation of listening silence. To eliminate this indicator, a graph of the battalion's communications should not show dramatic changes in communications levels.

VOLUME OF MESSAGES

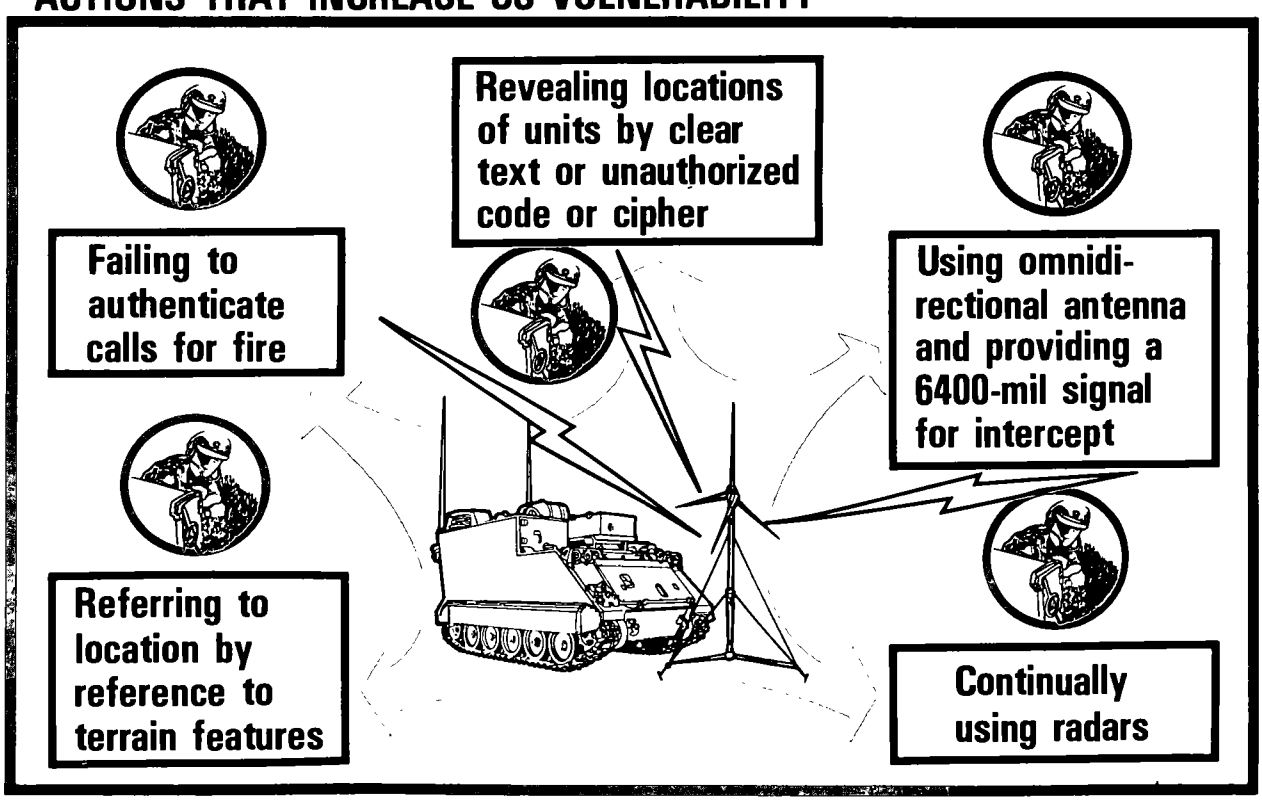


Examples of signal security countermeasures:

Employ short transmissions.
Authenticate transmissions.
Use listening silence.
Employ authorized codes only.
Employ wire.
Set radios on low power.
Use secure voice transmissions.
Remote radios and antennas.
Employ directional antennas.
Use decoy antennas.
Turn on radars only when they are needed to locate enemy units that are firing, and then for the shortest time possible.
Separate secure and unsecure radios.
Employ a random transmission schedule.

Because the field artillery relies heavily on radios to communicate and on radars to acquire targets, SIGSEC is of prime importance. Without SIGSEC, the battalion becomes vulnerable to enemy electromagnetic intelligence and winning the battle becomes more difficult.

ACTIONS THAT INCREASE US VULNERABILITY



US ARMY UNITS MAY NOT BE ABLE TO FIGHT AND WIN UNDER THESE CIRCUMSTANCES.

Electromagnetic intelligence.

Electromagnetic intelligence is the field artillery's greatest vulnerability. The field artillery and communication units are highest on the enemy targeting priority list. This is especially true for nuclear capable units. Therefore, the cannon battalion can expect that it will have a higher percentage of communication links destroyed than any other unit. This difference will be caused by intense enemy direction finding and jamming activity.

US forces can still operate effectively within this environment by maximizing the efficiency of available equipment and by using sound, commonsense countermeasures. Communications and radar discipline, security, and resourcefulness are the basic countermeasures by which the US will shield electromagnetic emissions from hostile observation.

As an example, the enemy DF network is the primary means by which he can locate US units through radio transmissions. It works best when it can detect electromagnetic emissions lasting 25 seconds or longer. This DF equipment will give the enemy a general location as to where the unit is with an accuracy of 500 to 1,000 meters. Through a combination of this general DF information, terrain analysis, and comparison with other intelligence sources such as aerial photographs, the enemy will locate the unit's position more accurately. The unit can expect to receive enemy artillery fire when that refined circular error probable location is accurate to 350 meters or less.

The following DF countermeasures can be used to confuse the enemy and deny him the ability to refine the unit's location to the critical 350-meter accuracy. In using these countermeasures, care should be taken to insure that acceptable communications are maintained at the same time that the unit's DF vulnerability is lessened.

DIRECTION-FINDING COUNTERMEASURES

- **Use low power** whenever practical.
- **Use horizontally polarized directional antennas** where tactical utility permits (sending and receiving stations must have like polarity for maximum efficiency).
- **Remote antennas** 1 kilometer or more. Care should be taken not to jeopardize other friendly units that may be in the remoted area.
- **Use decoy antennas.**
- **Transmit as quickly as possible,** then get off the air. Organize message content beforehand to minimize transmission time and consider not transmitting the message by radio or telephone if alternate means exist.
- **Site radio station with obstacle between it and the enemy** to reduce possibility of intercept. This is referred to as antenna masking.
- **Use roving command post techniques.**
- **Train radio operators.**
- **Take special care in positioning radars and microwave transmitters.**
- **Take special care in positioning jammers near field artillery.**
- **Use encryption devices** to prevent the enemy from refining DF locations with measurement data provided through poor COMSEC. **Use proper call signs.**
- **Use dummy load (antenna) for maintenance and tuneup procedures of radars.**

- **Employ random transmission,** rather than working on a schedule, to reduce the enemy's ease of interception.
- **Do not peak traffic before an attack.**
- **Use retransmission capability.**
- **Establish culng procedures for radars** to enhance short operating time.

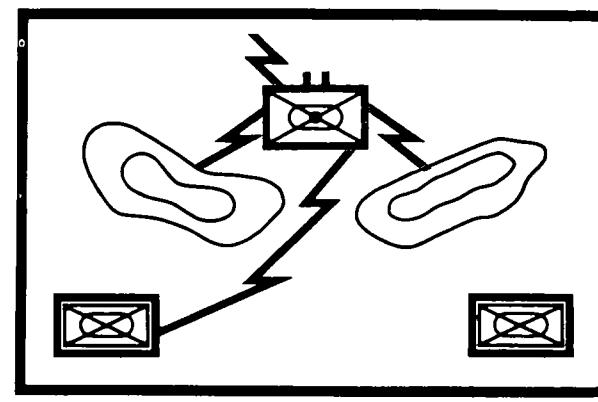
The leaders of the cannon battalion must emphasize the use of these countermeasures—particularly two: use of low power and directional antenna. Studies have shown that a combination of low power and directional antennas plus high frequencies significantly reduce the enemy's ability to locate units by DF. Anything that can be done to decrease his locating ability will increase the survivability of US cannon battalions. New equipment has become available to help place the proper emphasis on these techniques.

With the addition of the AT 984 long wire antenna to field artillery tables of organization and equipment (TOE), available. In combat, extensive use will be made of these directional antennas, of antennas that have been directed at the distant receiver, and of field expedient directional antennas.

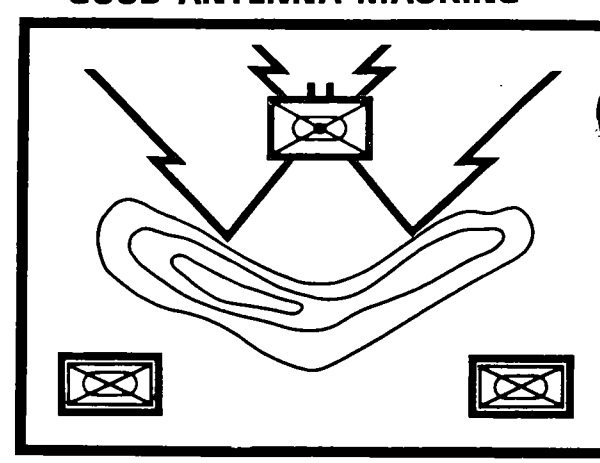
The jeep antenna, AT 912 or AS 1729, can be made bidirectional by tying it down and pointing it at a right angle to the direction of desired transmission. This also makes the antenna horizontally polarized and difficult for the enemy to locate by DF.

A fast way to make an omnidirectional antenna directional is to mask it behind a hill, cliff, or stone building. This will modify the transmission wave in a directional way.

POOR ANTENNA MASKING



GOOD ANTENNA MASKING



Situations may arise where it is not practical to make an antenna directional or the antenna on hand does not provide the necessary range to the desired receiver. TC 11-5, *What's Up: Know How to Repair and Fabricate Antennas,* covers those cases and gives detailed guidance on the construction of field expedient antennas.

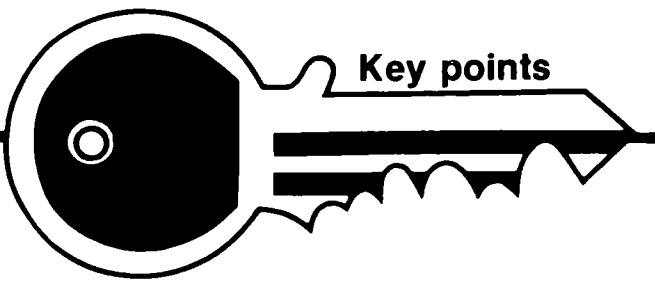
Evaluation.

During training, the division OPSEC element will conduct evaluations to establish an OPSEC data base. It will then analyze this collection of data to discern possible patterns and deficiencies. The G3 should disseminate these results to those units in need of assistance. The results of this analysis will help in eliminating patterns and enhancing battlefield survivability.

In combat, either the OPSEC posture of a unit is strong or there may be no one left alive to perform evaluation once the shooting has stopped. At the cannon battalion level, the S3 should evaluate the effectiveness of the OPSEC measures taken during an operation and correct any deficient applications. He should also insure that the battalion's parent headquarters receives the results of his findings and corrections so that others may benefit. *The ultimate measure of the effectiveness of applying OPSEC measures is survivability.*

Recognition and identification of forces on the battlefield.

The United States, when conducting operations within the NATO Alliance, must be prepared to use the procedures agreed to in the ratification of STANAG 2129, *Recognition and Identification of Forces on the Battlefield.* Details of the agreement are included as appendix I to this publication.



Key points

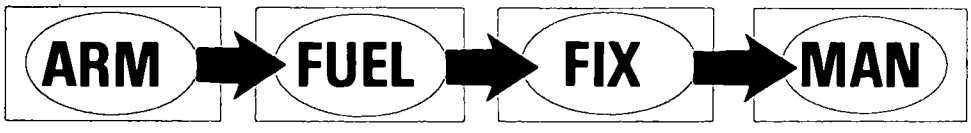
- For the field artillery, OPSEC measures have two goals—increased survivability and mission accomplishment.
- Essential elements of friendly information must be protected or disguised.
- Patterns can be detected.
- Signal security must be stressed.
- OPSEC measures are effective in combat—if the battalion has planned and trained for their use before the battle.

CHAPTER 5:

Combat Service Support Operations

This chapter tells the cannon battalion commander and staff how combat service support operations are executed.

The purpose of combat service support operations is to put the maximum possible number of operating weapon systems on the battlefield. While the division support command (DISCOM) and corps support command (COSCOM) are organized to provide a variety of combat service support to divisional and nondivisional units, their most important functions are to—



weapon systems. And they must do this as far forward as the tactical situation permits in order to return inoperable weapon systems to the battle as quickly as possible.

Organization for combat service support.

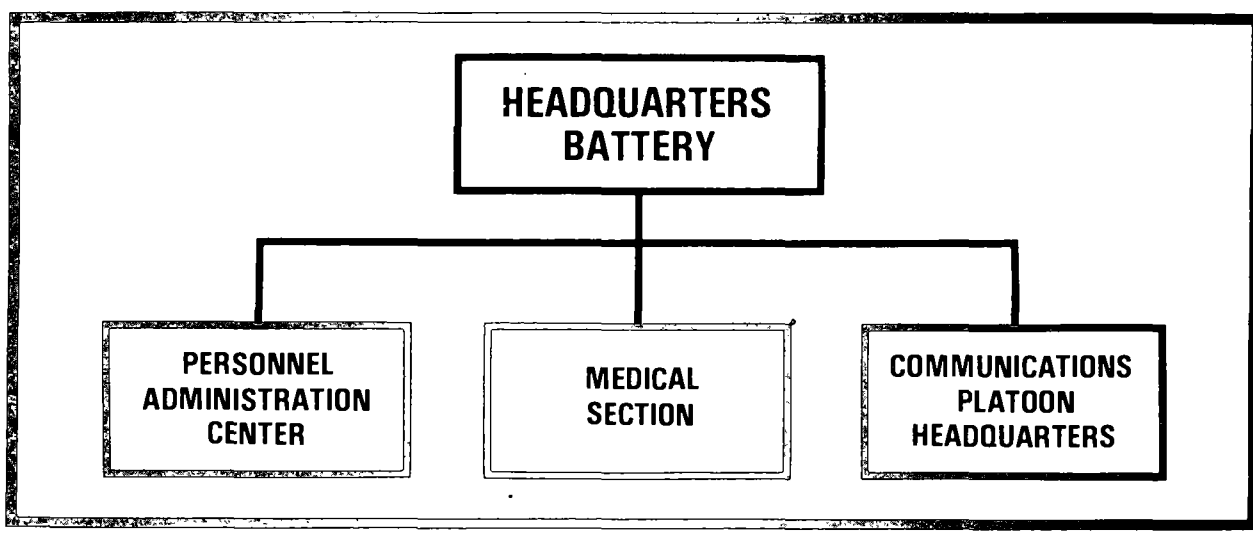
The cannon battalion provides a variety of combat service support to its batteries. It is the support link between batteries and divisional or corps support units. Organic CSS elements are located in both headquarters and service batteries. In some battalions (105-mm battalions of the airborne and airmobile divisions and the separate infantry brigades), CSS is provided by a combined headquarters *and* service battery.

The following organic combat service support elements are generally found in cannon battalions.

Personnel administration center. The personnel administration center, which is assigned to headquarters battery and supervised by the S1, handles all battalion personnel and administrative support.

Medical section. The medical section in the headquarters battery stocks and provides medical supplies for the battalion aid station. The aidmen who are deployed to the batteries are assigned to the medical section and are directly supervised by a physician's assistant (battalion surgeon in nondivisional battalions). The medical section is responsible for organizational maintenance on all battalion medical equipment.

Communications platoon headquarters. The communications platoon headquarters performs organizational maintenance for communications-electronics equipment in the battalion headquarters and headquarters battery and maintenance on firing battery communications-electronics equipment that cannot be accomplished by the batteries.



Supply section. The supply section, an organizational element of the service battery, requests, receives, and issues all classes of supply except ammunition, medical supplies, and repair parts.

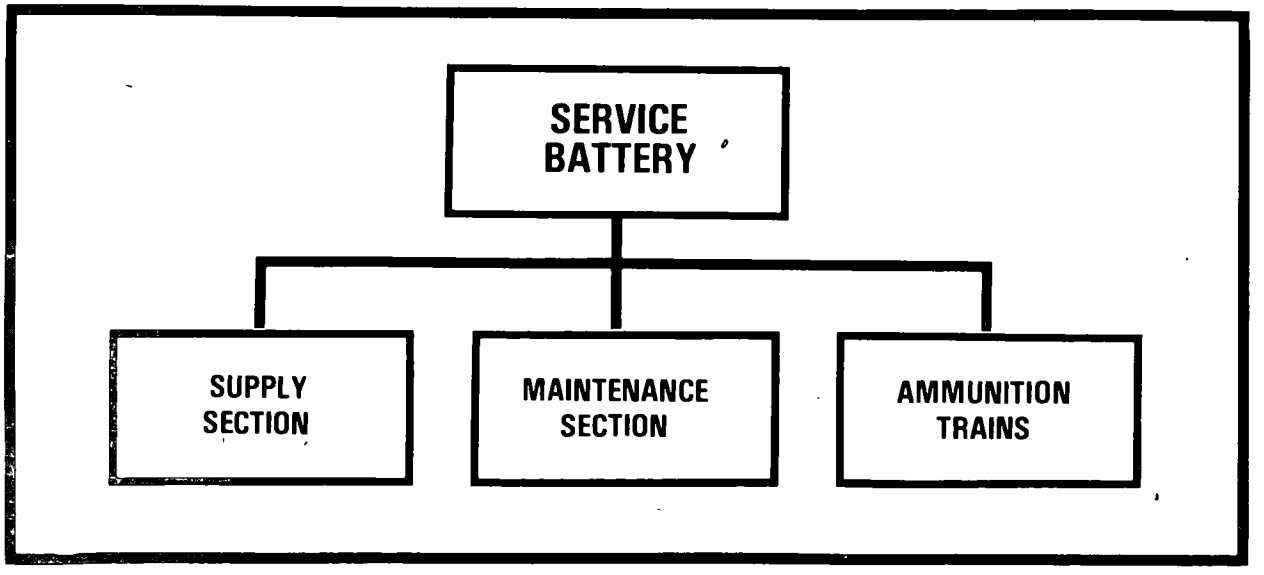
Maintenance section. The maintenance section, also an element of the service battery, is responsible for performing organizational maintenance

services on all equipment in the battalion except communications-electronics and medical equipment. It performs organizational maintenance that cannot be accomplished by battery maintenance personnel. The maintenance section also stocks and provides repair parts and performs battlefield recovery and evacuation.

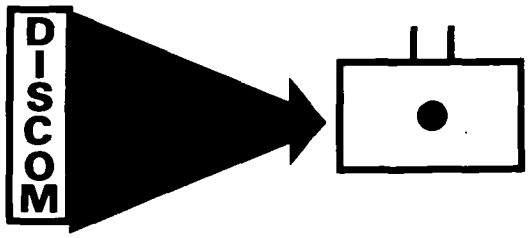
Ammunition trains. The battalion ammunition section is an element of the service battery. It is supervised by and receives orders from the battalion ammunition officer who performs the ammunition supply and resupply functions for the battalion. The number of battalion ammunition sections varies according to organization. Most battalions have three.

Certain battalions are organized with additional, or modified, combat service support elements. For example, the field artillery battalions in separate brigades are assigned weapon locating or moving target locating radars and—except for the airborne and infantry brigade—a meteorological section. These sections are authorized mechanics. Supply and maintenance functions in the direct support field artillery battalions of the airborne and airmobile divisions are combined into one section or platoon.

Each battery in the cannon battalion has a limited combat service support capability. A battery headquarters normally has its own maintenance, mess, supply, and communications sections. Operational considerations may require some or all of these elements to be centralized at battalion. For example, consolidating personnel administration, supply, and food service personnel and equipment in the service battery can provide firing battery commanders more time to concentrate on the tactical situation. Support is then provided to the firing battery on a user basis. Also, each firing battery usually has an ammunition section.

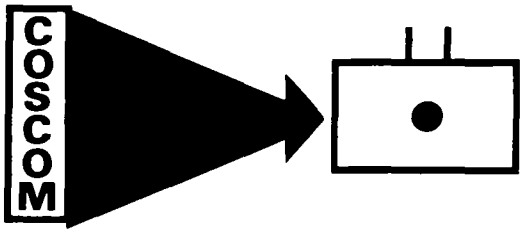


DIVISIONAL



The divisional cannon battalion receives combat service support from the divisional support command. The division materiel management center (DMMC) provides centralized and integrated materiel management for all classes of supply and maintenance except medical, cryptographic, and maps for units assigned to the division. Maintenance, supply, and transportation support is provided by the maintenance, supply, and transportation battalions in the DISCOM. The divisional cannon battalion coordinates its combat service support through the DISCOM forward area support coordination officer (FASCO), who is usually located in the brigade support area.

NONDIVISIONAL



Normally, nondivisional cannon battalions receive combat service support from units in the corps support command. Nondivisional cannon battalions may be supported by DISCOM units when the situation dictates; however, this exception must be clearly specified. The DISCOM may require augmentation to provide this support. When a nondivisional cannon battalion is attached to a division, the corps G3 specifies what administrative and logistical support will be provided. The COSCOM is specifically tailored to support the units assigned to the corps. Normally, COSCOM units are formed into area support groups, which provide combat service support on an area basis. Combat service support is managed by the COSCOM materiel management center. This center should insure that the battalion receives required combat service support even though the battalion may move from one support group area to another.

The cannon battalion in a separate maneuver brigade receives combat service support from the brigade support battalion. This battalion supports the separate brigade just as the DISCOM supports the division.

Trains operations.

The battalion S4 is responsible for the battalion trains. The S4 and the battalion executive officer generally work together to supervise trains operations. Such support operations should consider—

- **Positioning service support resources to insure timely and flexible response while minimizing exposure to enemy fires.**
- **Displacing the trains as required to insure continuous support.**

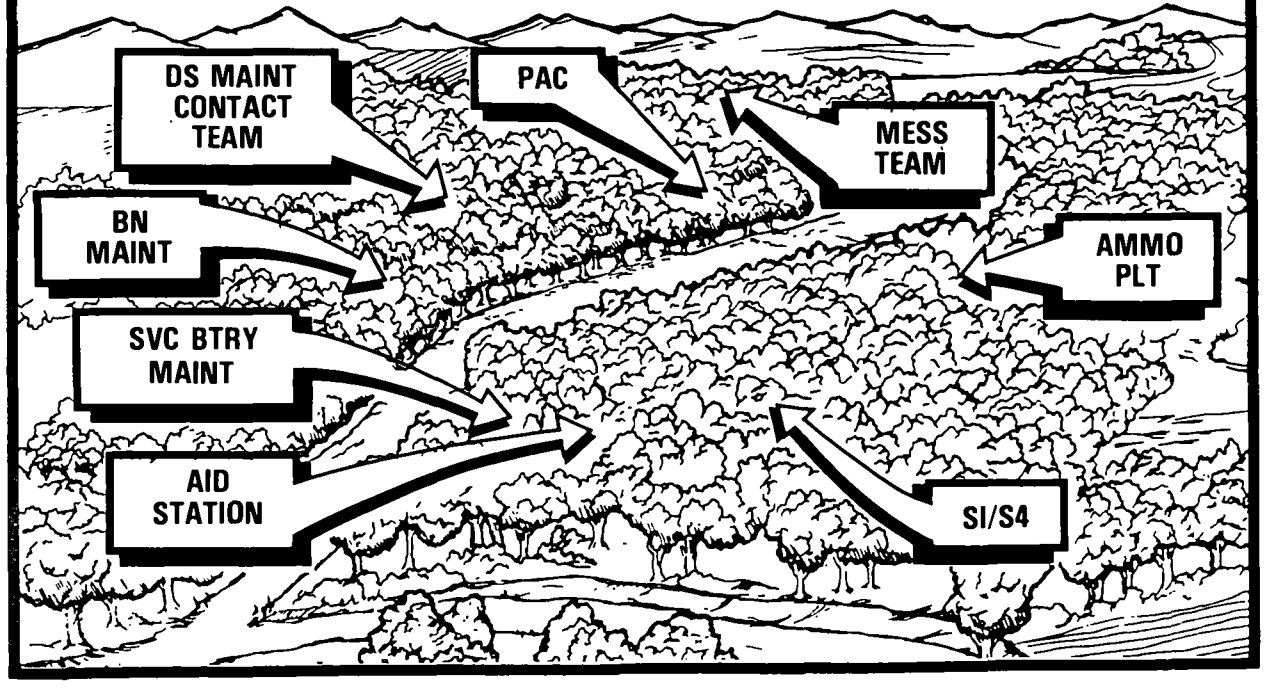
Trains organization. The battalion trains organization is based upon the battalion mission, the enemy, the terrain, and the resources available. They may be organized in a *single* location or in a *dual* location.

SINGLE LOCATION: UNIT TRAINS

If logistical resources are centralized in one location, they are called *unit trains*. This option provides:

- **Centralized coordination and control of logistical personnel and equipment.**
- **Enhanced security.**
- **A single base for combat service support activities.**

Unit trains may be appropriate in slow-moving or static situations, when firing batteries have organic or attached support, or when the tactical situation forces the trains to be a self-contained and self-sustaining operation. A unit trains setup would consist of the entire service battery and those headquarters elements not located with the battalion command post.

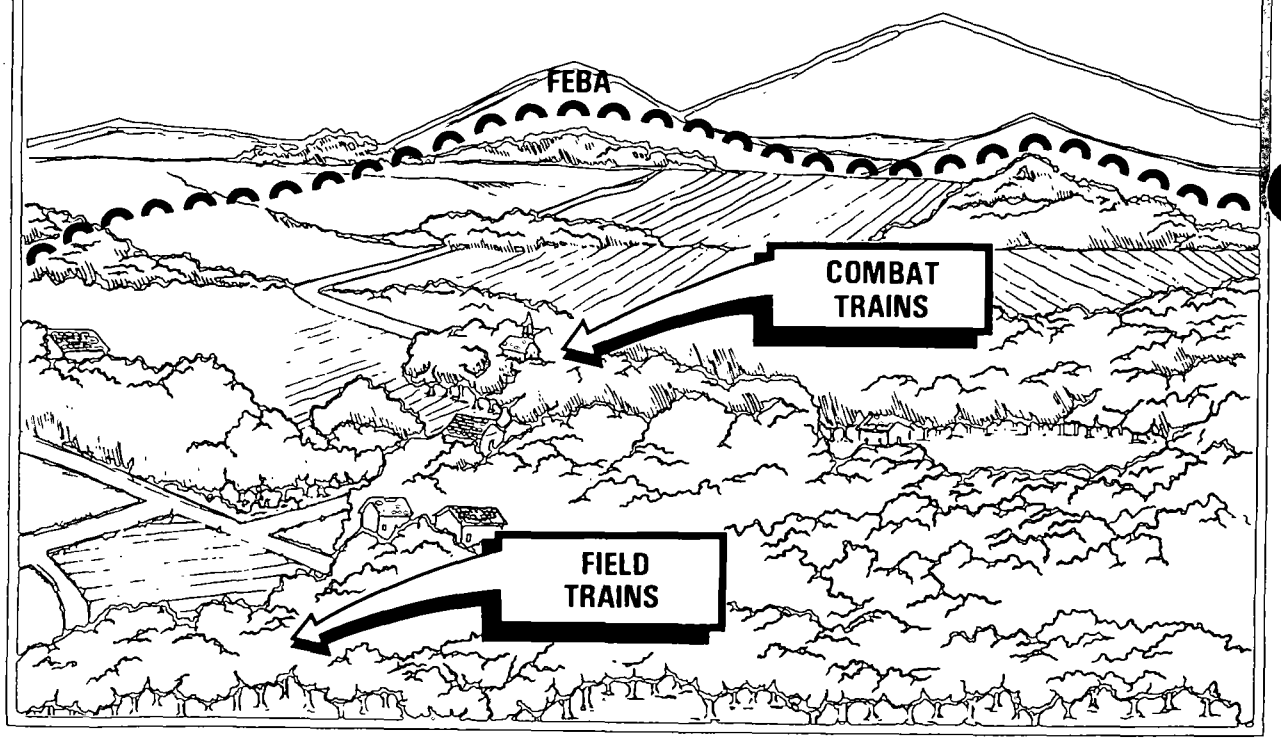


DUAL LOCATION: COMBAT TRAINS AND FIELD TRAINS

Echeloning trains into *combat* (forward) and *field* (rear) trains provides:

- **Immediately responsive forward support tailored to the tactical situation.**
- **Flexible resource usage.**
- **Increased resource survivability.**

Combat trains provide responsive support forward and meet the requirements for the tactical situation. Combat trains can include petroleum, oil and lubricants; ammunition sections; selected maintenance support teams; and a battalion aid station. The field trains, including the personnel administration center, the remaining maintenance sections, battalion ammunition trains, and the supply and food service sections, are positioned with ready access to the brigade trains or some other combat service support element farther to the rear. The battalion executive officer and S4 position themselves where they can best control the battalion logistical operations—perhaps the executive officer with the combat trains and the S4 with the field trains.



Positioning the trains. The battalion S4 coordinates with the executive officer and S3 and selects trains locations.

The combat trains *must* be far enough forward to be responsive.

Built-up areas are good locations for trains because they provide cover and concealment for vehicles and sheltered areas for maintenance operations at night. When built-up areas are used, trains elements should occupy buildings near the edge of the area to reduce the chance of being trapped.

A GOOD TRAINS LOCATION HAS:

- **Defensible terrain.**
- **Sufficient space to disperse vehicles and activities.**
- **Concealment from hostile observation.**
- **Firm ground for ammunition and fuel vehicles.**
- **A water source.**
- **A suitable helicopter landing site.**
- **A good road net to the cannon batteries and to adjacent or rear support units and supply points.**
- **Suitable communications with forward command and firing elements and with rear support units.**

The S4 must coordinate with adjacent units and the maneuver commander who "owns" the area when selecting a trains location.

The field trains location may be selected by someone other than the S4 if the field trains are positioned with another element such as a maneuver brigade trains. Such a location facilitates coordination between battalion personnel and representatives from forward direct support units and enhances security for battalion elements. However, turnaround time, communications requirements, or other mission-related considerations may require that the field trains be located elsewhere.

Trains displacement. Proper positioning of trains can minimize displacements and increase the quantity and quality of support. When repositioned, the trains are displaced by echelon to permit continuous combat service support to the battalion.

Trains security. Planning and establishing security for the battalion trains is the S4's responsibility. Paramount among defensive considerations should be defense against air attack.

Executing trains operations. The battalion S4 is responsible for selecting a battalion supply route for resupply, evacuation, and maintenance support. The proposed route must be coordinated with the S3. This route extends forward from the support units in the brigade or division support area to the batteries. Coordination with adjacent combat, combat support, and combat service support units is necessary to insure adequate movement of support resources both forward and to the rear. Alternate routes should also be selected and coordinated and their locations disseminated so service support

operations can continue if unexpected battlefield changes occur.

PRESCRIBED LOAD

A prescribed load is that quantity of combat essential supplies and repair parts authorized by the major commander for classes II and IV, to be on hand or carried on the unit vehicles to enable the unit to sustain itself until resupply can be effected. Normally, a prescribed load consists of supplies for 15 days.

BASIC LOAD

A unit basic load is based on the type and number of weapon systems in the battery. The distribution of the basic load should be prescribed by standing operating procedures. Normally, basic loads are prescribed for battalion-sized units or smaller. Basic loads for field artillery units are expressed in terms of number of rounds of ammunition by type per weapon. The size and mskeup of the basic load are designed to provide sufficient ammunition to meet the anticipated combat needs of a unit until normal resupply is accomplished.

Supply operations.

Supplies are those items required to equip, maintain, or operate the battalion. Supply operations are determining requirements and requesting, procuring, storing, and distributing items to fulfill those requirements.

Batteries stock some combat-essential supplies and repair parts called prescribed load or, in the case of ammunition, basic load. Normally, the minimum stockage level is directed by a higher command, such as division or corps or, in some cases, by Department of the Army publications. Prescribed loads enable a unit to initiate and sustain combat operations until resupply can be effected.

When possible, supplies are delivered directly to the firing batteries. This is unit distribution. If the batteries must draw supplies from a distribution point, this is supply point distribution. Direct delivery of *critical* items from division or corps support units to the requester is another distribution method. This is throughput distribution. Distribution priorities for critical items are determined by the battalion S3 based on recommendations from the S4 and the battalion operational requirements. Normal supply priority is class V, POL, and repair parts.

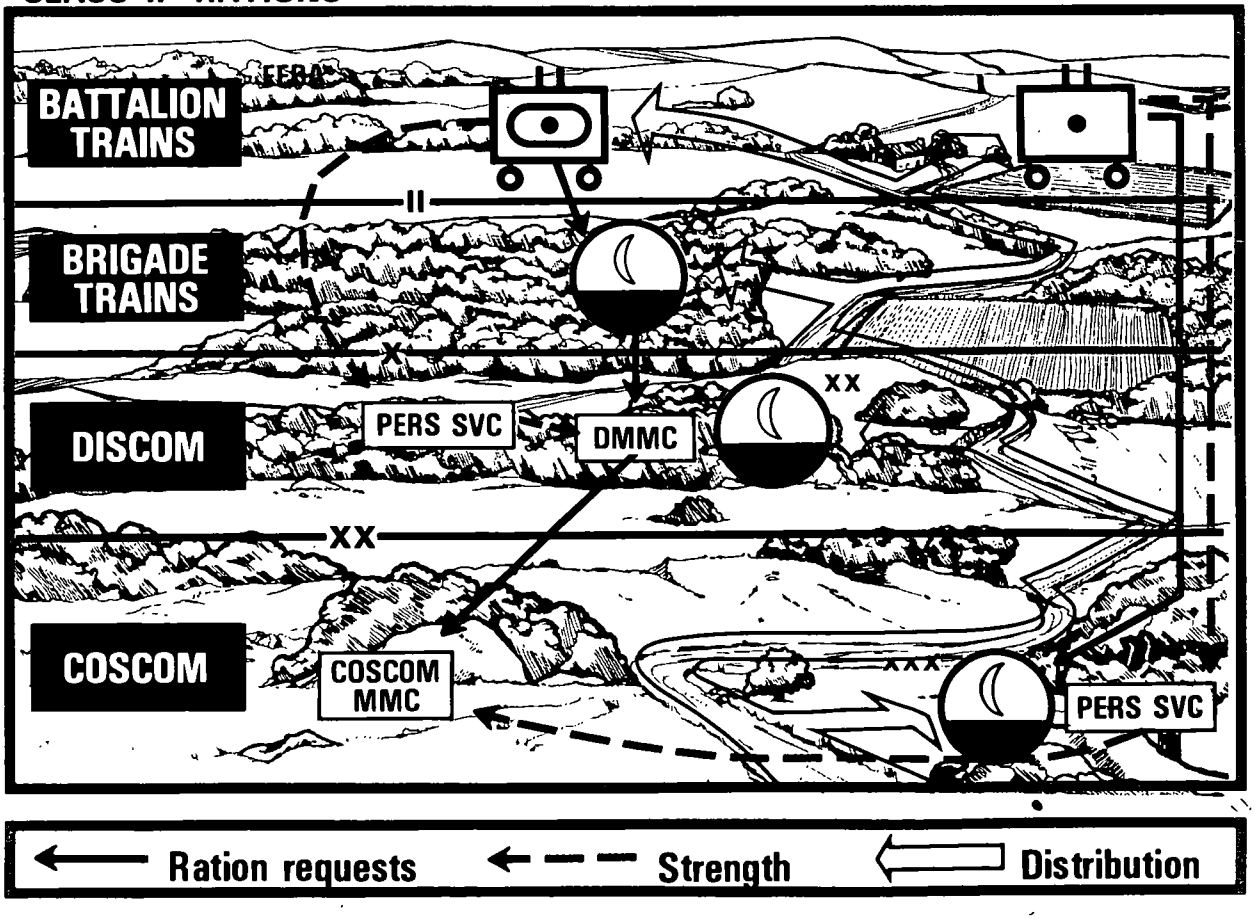
Supplies are grouped into 10 major classes. The following is a brief description of each class as it impacts on the cannon battalion.

Class I: Rations. Class I items for the battalion are requested by the cannon battery food service sergeant from the supporting divisional or COSCOM direct support class I supply point. Rations are requested by number and type meal only (meal, combat, individual (MCI), standard B ration, theater menu).

Divisional battalions draw rations from a DISCOM class I distribution point. Nondivisional battalions draw rations from a COSCOM general support class I point. When nondivisional battalions are attached to a division, the battalions should draw their class I items at the division forward supply point. Usually, rations are picked up by organic transportation, but they may be delivered direct to the unit by division or corps. For some operations, additional operational rations, food packets, ration supplements, health aids, or standard menu items in amounts of greater than normal menu allowances may be required. These are provided to units when rations are issued.

How a unit feeds and what rations are served are important considerations. The normal combat meal will be the individual combat meal—commonly called the "C" ration. *Crew feeding* from

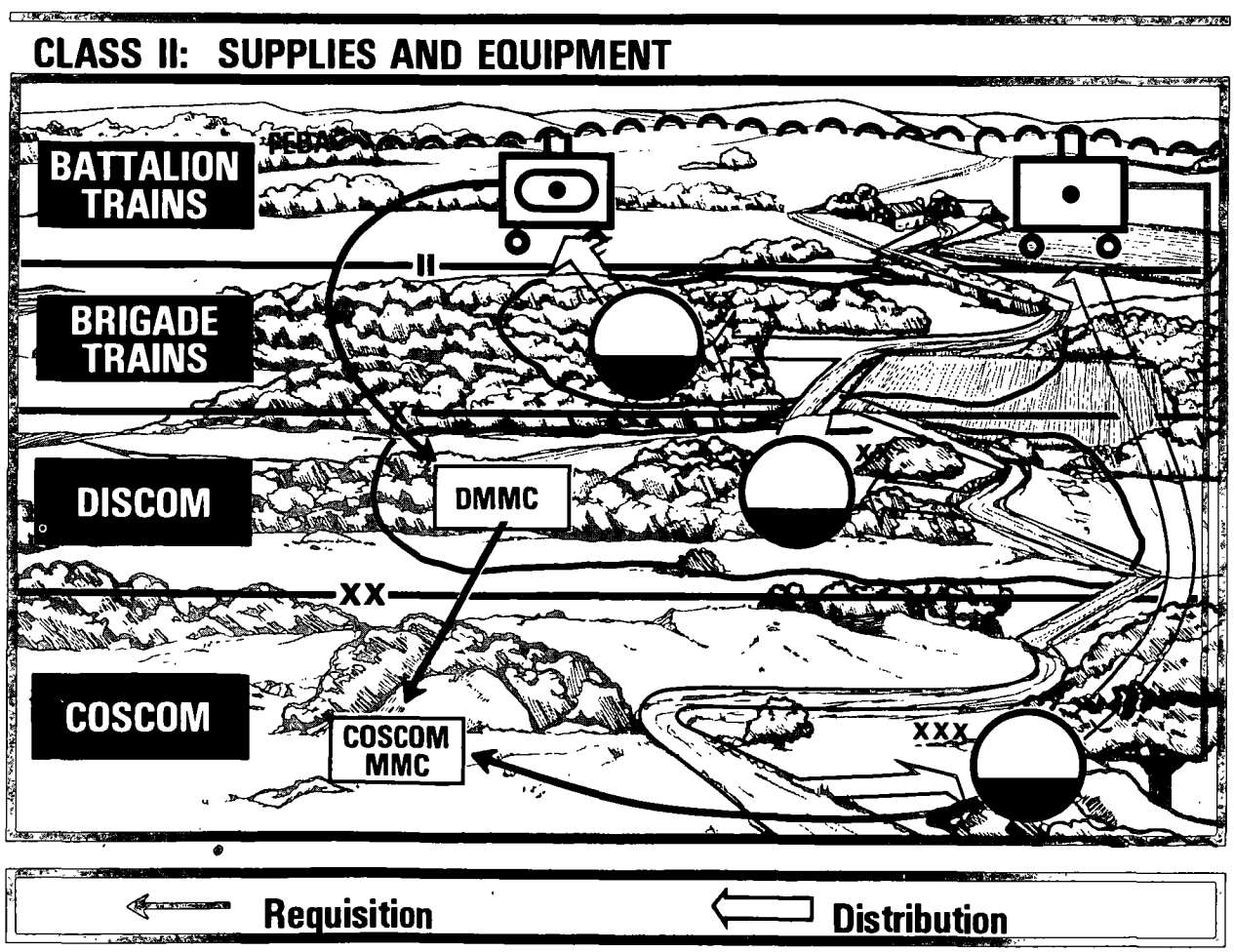
CLASS I: RATIONS



these canned rations will be the usual method. To meet battlefield contingencies, there should be at least a 3- to 5-day supply of such rations on every vehicle.

Occasionally, serving hot meals ("B" rations) is desirable. The S4—or his designated representative—develops a feeding plan, with instructions concerning HOW and WHEN to feed. Sometimes battery food service elements can move with the battery and prepare and serve meals in position. It is often best, however, to centralize preparation supervised by the senior food service sergeant in the battalion trains location. Food service (or supply) trucks can tow water trailers to the batteries as part of the normal load. Water is available at distribution points established by engineer units and, when authorized, from local sources.

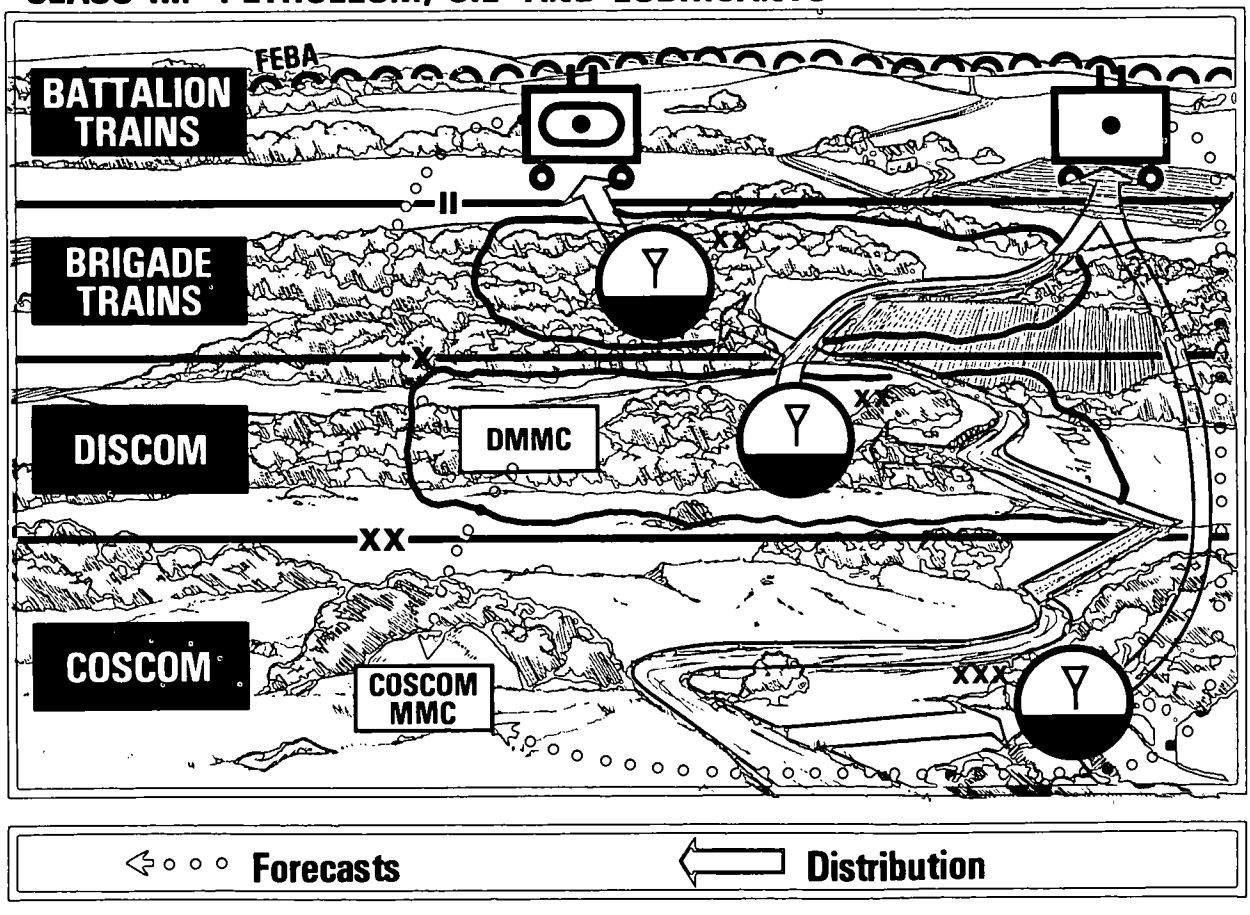
Class II: Supplies and equipment. This class applies to all supplies and equipment (except cryptographic) prescribed by tables of organization and equipment, common tables of allowances (CTA), and prescribed load lists. Class II supplies include clothing, individual equipment, tentage, tool sets, and administrative supplies. When a



class II item is lost, destroyed, or worn out, cannon batteries send replacement requests through the battalion S4 to the DISCOM or the supporting supply battalion for nondivisional battalions. The supply section picks up class II items from the forward supply section with the brigade trains or the supporting COSCOM supply point for nondivisional battalions and delivers them to the requesting unit. In some cases, corps or divisional support units may deliver critical items directly to the requesting unit.

Class III: Petroleum, oil and lubricants. Petroleum resupply begins when a unit submits a request or sends a tanker to the supply and transportation (S&T) battalion class III forward distribution point in the brigade trains area for resupply. The division materiel management center (MMC) receives status reports from the forward area support coordinator and coordinates requirements and priorities with the S&T battalion. Each supported unit in the division area submits a periodic forecast for bulk fuel and packaged products (grease, oil, and lubricants) to the division materiel management center, indicating any change to the previously experienced supply rate. Throughput

CLASS III: PETROLEUM, OIL AND LUBRICANTS



shipment of bulk class III supplies is accomplished on a routine basis direct to consuming division units or as far forward as practicable. A combination unit and supply point distribution method is employed. Short-range requirements go to supporting direct support units to insure bulk petroleum availability for immediate needs. Individual vehicles may be refueled at direct support or general support mobile filling stations located throughout the corps area. POL and packaged products are repositioned from the division materiel management center like other classes of supply.

Battery refueling operations are carried out in two ways: The fuel truck is taken to battery gun and vehicle positions, or vehicles are moved alternately to centrally located fuel trucks. Moving fuel trucks to the vehicles is the quickest refueling method. When vehicles are moved to the tanker, other classes of supply can also be replenished in the same location. The battalion standing operating procedure should prescribe procedures for both types of refueling, and procedures should be practiced during field training.

Class IV: Items for which allowances are not prescribed. This class of supplies includes items such as construction, camouflage, barrier, and fortification materiel. Requisitions for regulated class IV items (fortification and barrier materiel) are submitted through command channels. Nonregulated items (small quantities of nails, common electrical, plumbing, and similar hardware items) are requested or obtained from the supporting direct support unit.

Class V: Ammunition. The S4 plans for class V operations, and the ammunition officer supervises resupply operations.

The S3, S4, and ammunition officer must continually coordinate and exchange information concerning ammunition. Each must know the required supply rate (RSR) submitted to higher headquarters, the controlled supply rate (CSR) established by higher headquarters, and the authorized basic load. This information must also be provided to the battalion and firing battery commanders.

The tactical situation may warrant requesting extra ammunition for preparatory fires. With higher headquarters approval, the ammunition on hand in a unit may temporarily exceed the basic load. This approval is explicitly for *ammunition for immediate expenditure.* Such ammunition is drawn on the premise that it will be expended within the next 24-hour period. Higher headquarters considers this ammunition expended when issued. If circumstances beyond unit control preclude expenditure within that time frame, then ammunition excess to the basic load is reported to higher headquarters during each 24-hour reporting period until that excess is expended or redistributed to other units.

Class V supplies are obtained by supply point distribution from ammunition supply points located in the corps area. On occasion, the COSCOM may establish ASPs farther forward in the division area. The DISCOM, working with COSCOM, may establish ammunition transfer points (ATP) in the brigade support area. Normally, corps

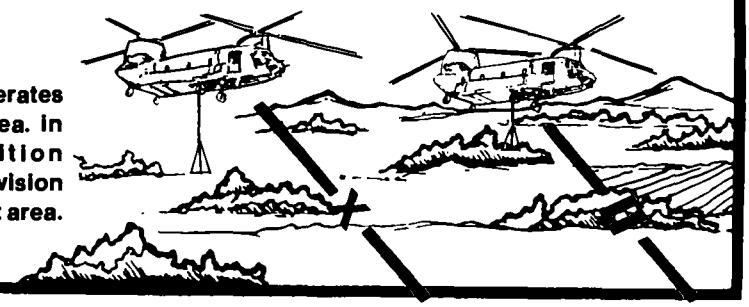
transportation vehicles deliver ammunition to designated ATP locations. Each ATP includes corps and divisional personnel, equipment from the division supply and transportation battalion, and ammunition resupply vehicles from the cannon battalions. The ATP concept pertains only to high density and tonnage ammunition such as tank and field artillery gun ammunition.

Ammunition may also be delivered by surface or air from the corps or DISCOM directly to the battalion or battery area.

CLASS V: AMMUNITION

Distribution

The airborne DISCOM habitually operates mobile ATPs in the division support area. In the airmobile division, ammunition distribution points are located in the division support area and in each brigade support area.



The battalion ammunition officer must tailor the battalion ammunition train and the battery ammunition sections to optimize support. The mission, tactical situation, and locations of the battery and the battalion support elements will determine how this is done.

The firing battery ammunition sections may operate *independently,* merely stopping at the designated control point to authenticate transportation orders. In this case, the ammunition officer holds battalion resources under his control, selectively augmenting one or more firing batteries with battalion trucks and personnel. While this technique is suitable under some circumstances, it is not an efficient way to operate, especially in a fast-moving situation. The ammunition officer must *always* know the location and disposition of all the battalion's resources.

Ammunition sections may be *centralized* under the operational control of the battalion ammunition officer. This provides maximum flexibility for continuous resupply operations and concentrated support for priority units. Centralized supply can range from a daily resupply convoy for the entire battalion to a continuous movement of single vehicles to and from the ATPs and ASPs.

SUCCESSFUL RESUPPLY DEPENDS UPON:

- **Carefully estimating requirements based on usage, experience, known limitations, and the type of firing anticipated.**
- **Efficiently employing vehicles and personnel to insure a sustained resupply effort.**
- **Anticipating demands for critical needs and adapting to changing situations.**
- **Routinely exchanging information between battalion and batteries concerning resources required, resources available, and factors bearing upon resupply.**

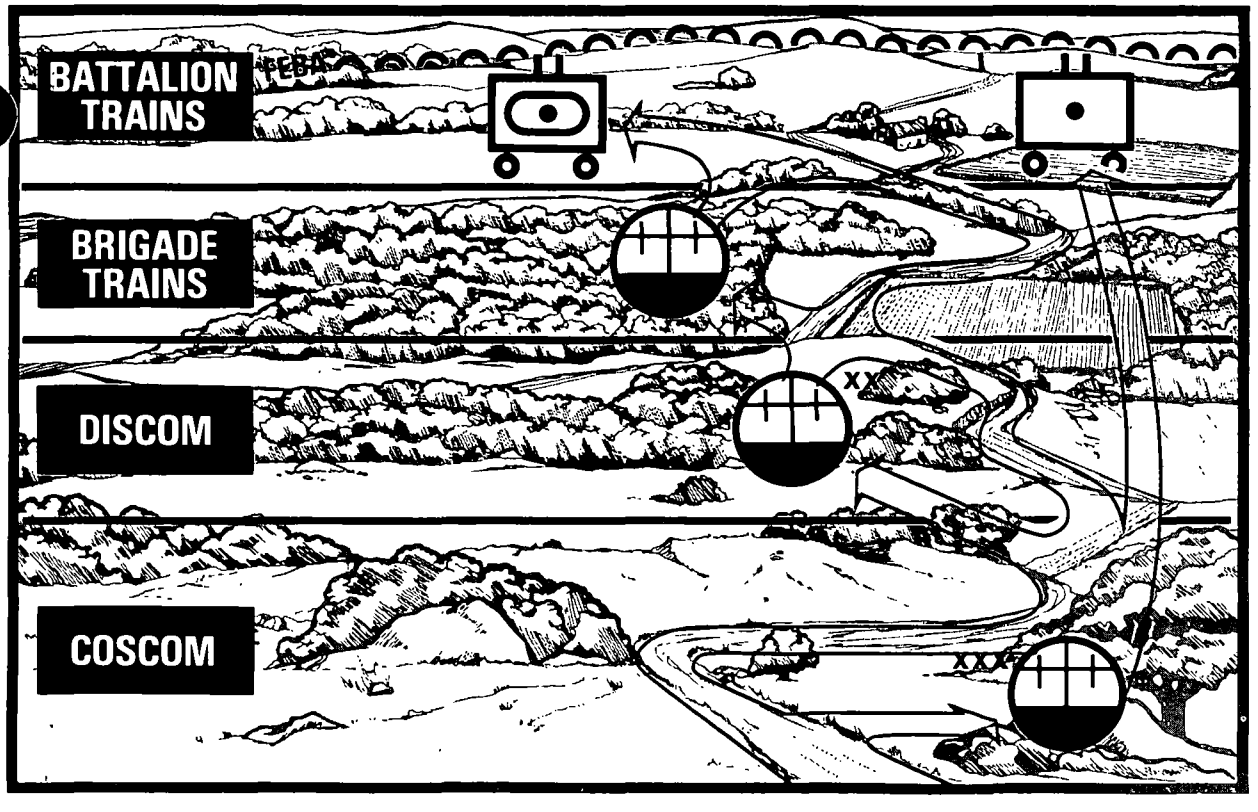
Class VI: Personal demand items. Class VI includes personal items sold through COSCOM post exchanges (PX). Requests for support are submitted by the S1 through administrative channels when no PX is available.

Class VII: Major end items. The issuing of major end items (howitzers and tanks, for example) is closely controlled through command channels. Issue priorities for the replacement of battle or other losses are established based upon item availability, unit mission, and the tactical situation. Requests from divisional units are processed by the division materiel management center. Nondivisional unit requests are

processed by the COSCOM materiel management center. Class VII items may be delivered to the battalion, or the battalion may be required to pick up the items from a designated support unit. In some cases, weapon system replacement items (howitzers) may be provided to the battalion with crew, fuel, and ammunition.

Class VIII: Medical supplies. Medical supplies are obtained for divisional battalions by the medical section from the divisional clearing station located in the brigade support area. Nondivisional battalions obtain medical supplies from the COSCOM class VIII supply point.

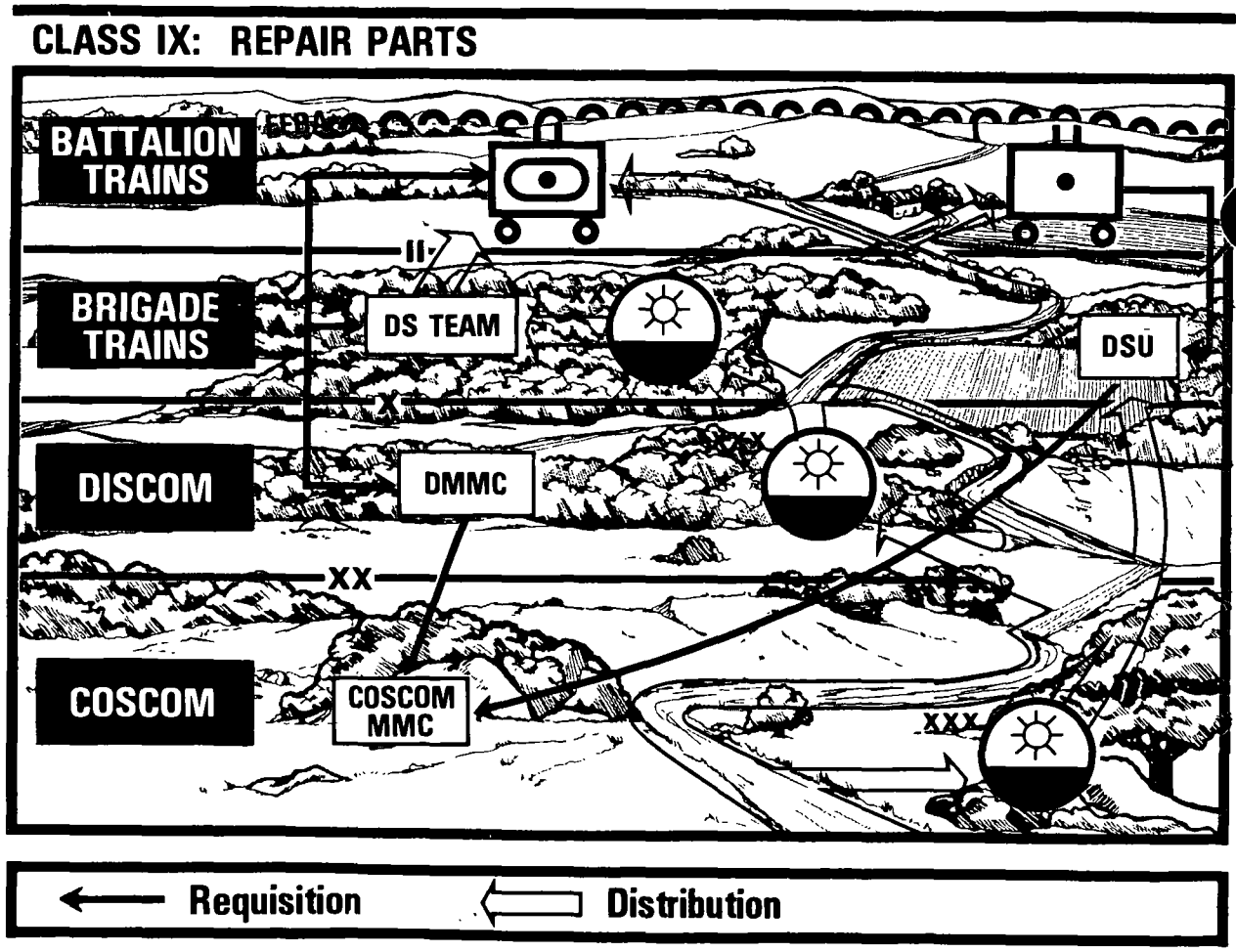
CLASS VIII: MEDICAL SUPPLIES



Distribution

Class IX: Repair parts. The cannon battalion stocks repair parts based on a prescribed load list (PLL). High demand repair parts are usually stocked by battery maintenance sections. Other repair parts (except medical and communication) are stocked by the battalion maintenance section. Normally, communications-electronics repair parts are stocked by the battalion communications platoon, although the battalion commander may choose to let the maintenance section keep the records. The medical section stocks medical repair parts. Usually, the maintenance section manages repair parts for its parent unit. Each battery PLL can be managed separately, or PLLs can be collocated at battalion level.

Repair parts are issued in response to a specific request or by direct exchange. The battalion obtains repair parts from the divisional forward support maintenance company located in the brigade trains area. Repair parts are delivered to battery maintenance sections in response to submitted requests.



Class X: Nonstandard items. These items are intended for supporting nonmilitary programs such as agriculture and economic development.

Those items not included in supply classes I through IX are requested, obtained, and delivered by the S4 just as class IV items are handled.

Maps are obtained by the S4 from the supply and service company based on requirements established by the S2. The S2 distributes maps to battalion units as required.

Maintenance operations.

Maintenance is keeping materiel in serviceable condition or restoring it to a serviceable condition. A successful maintenance program depends upon a concentrated effort by all personnel in the cannon battalion. The battalion motor officer serves as the battalion commander's principal maintenance staff officer. As with other combat service support functions, the commander can centralize the maintenance effort.

When maintenance sections are consolidated, maintenance support teams should be organized for temporary attachment to firing batteries. These teams can be dispatched to battery areas when repairs or services beyond the operator or crew capabilities are required. This allows the battalion motor officer flexibility in supporting the batteries. Requests for support can be answered by teams tailored to handle the problem encountered by the unit.

Preventive maintenance includes systematic servicing, inspecting, correcting initial failures before damage occurs, detecting and correcting abuse, and teaching proper equipment care and use. Preventive maintenance prevents minor shortcomings from becoming major deficiencies that require extensive repair. Preventive maintenance must be worked around the tactical situation. The effort is facilitated by using appropriate maintenance records. These records provide a method for recording the operation, equipment condition, maintenance accomplished, and modifications to equipment.

FM 6-50, *The Field Artillery Cannon Battery,* chapter 18, contains a thorough discussion of battery preventive maintenance operations.

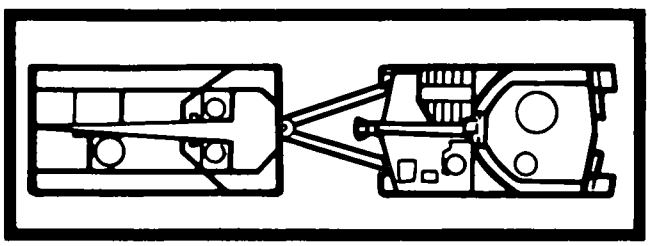
Battery maintenance operations are limited to certain organizational maintenance services and minor repairs. Maintenance tasks that cannot be done by battery personnel within a reasonable time must be done by battalion maintenance or communications platoon personnel, who will either assist or do the work.

The combat environment will likely dictate that organizational maintenance personnel, organized in maintenance support teams, be well forward. Vehicles and weapon crews must be trained and prepared to make as many adjustments and repairs as possible. Small class IX items with high usage rates should be held as far forward as possible in section vehicles.

If equipment becomes inoperable, it should be repaired onsite. If onsite repair is not possible, the equipment must be either evacuated, towed to a collection point, or destroyed in place.

Howitzers. Disabled howitzers that cannot be repaired by the crew are repaired by organizational maintenance personnel. In such cases, the motor officer should dispatch a maintenance

A HOWITZER RECOVERY METHOD



support team from the trains to examine the howitzer and repair it onsite. If the howitzer cannot be repaired there, it should be evacuated by battalion maintenance personnel. If the repair requires direct support maintenance, the battalion maintenance section evacuates the howitzer to the supporting forward support company. If time is short or evacuation capability does not allow this, the howitzer may be moved to a maintenance collection point along the supply route where it can be picked up later by the forward support company.

Vehicles. Disabled vehicles will be repaired or evacuated in the same manner as howitzers.

Communications equipment. Operator maintenance for communications equipment is done by battery personnel. When a piece of communications-electronics equipment requires organizational repair, the equipment is repaired by the radio mechanic from the communications platoon onsite or at the battalion communications platoon headquarters. If equipment requires direct support maintenance, it is evacuated by the communications platoon to the supporting maintenance battalion forward support company. Cryptographic equipment that requires repair is evacuated to cryptographic maintenance contact teams.

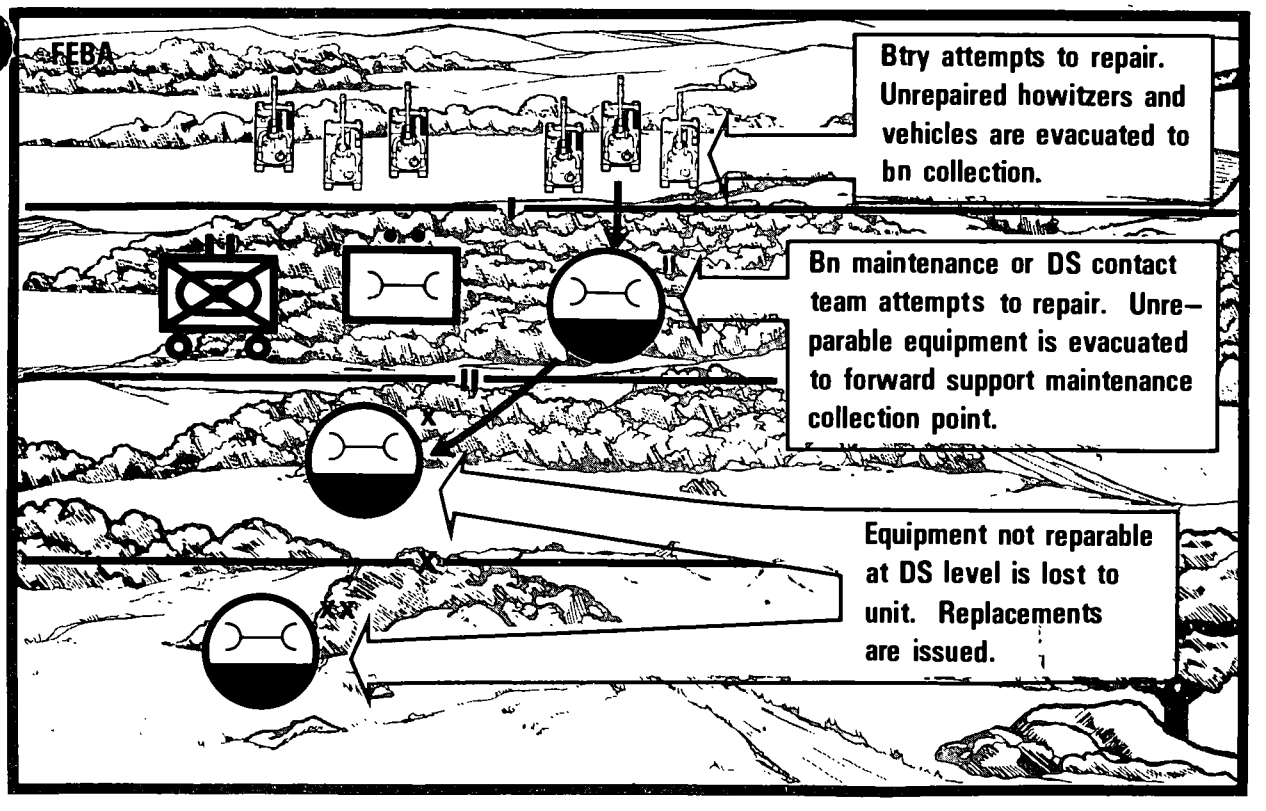
Medical equipment. Organizational maintenance for medical items is accomplished by the battalion medical section. Medical equipment requiring maintenance above the organizational level is evacuated through medical channels to the medical company located in the brigade support area or a comparable COSCOM element.

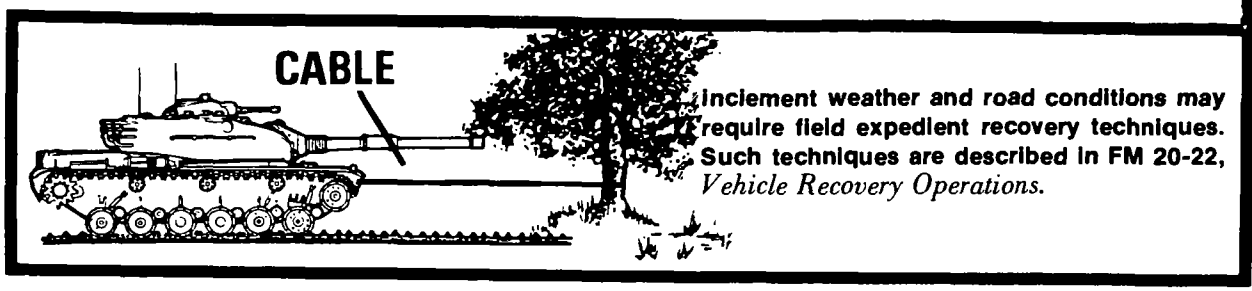
Individual and crew-served weapons. Individual and crew-served weapon maintenance is done by soldiers and crews and by battery armorers or artillery mechanics. If the weapon is not reparable, a direct support maintenance support team is requested from the forward support company to repair the weapon onsite. If onsite repair cannot be done, the weapon will be evacuated for repair. If the weapon cannot be repaired quickly, a replacement should be requested.

Other equipment. Other unit equipment, such as generators, is repaired by battery or battalion personnel. Repairs that are beyond the organizational maintenance capability are accomplished by a direct support maintenance team onsite or the item is evacuated to a direct support forward company.

If howitzers or vehicles are abandoned, the command in whose area they are found is responsible for recovery. Recovered howitzers and vehicles are inspected, repaired, and placed in operation at the lowest level possible. Those requiring extensive repairs or salvage are towed to a designated collection point.

EQUIPMENT MAINTENANCE AND EVACUATION PROCESS





The battery evacuates salvage to the battalion maintenance point on vehicles making supply trips to the rear. Battalions usually operate a single collection area for salvage and captured enemy materiel near the battalion maintenance point. Items evacuated to battalion are in turn evacuated to the rear.

Captured materiel is collected and evacuated under supervision of the S2. Battalion logistical resources may be required to evacuate captured supplies. Captured enemy vehicles and equipment may sometimes be used to supplement organic transportation and materiel rather than being evacuated. Regardless of disposition, captured materiel is always reported to the next higher headquarters.

Vehicles or equipment may be destroyed to deny their use to the enemy. The decision to destroy equipment is made *only* on authority delegated by the division or corps commander. Destruction procedures should be contained in the battalion SOP.

The cannon battalion may be authorized to cannibalize or remove parts from damaged equipment or vehicles to return other equipment or vehicles to combat. Cannibalization policies are established by the division or corps commander.

Personnel support and administration.

The S1 supervises personnel and administration support in the battalion.

Personnel management. Personnel management includes classification, assignment, reclassification, reassignment, appointment, promotion, reduction, efficiency reports, conduct and evaluation reports, efficiency ratings, transfers, separations, and reenlistment for battalion personnel. These functions are performed primarily by the battalion personnel administration center (PAC). Batteries have a very limited administrative capability.

Maintenance of unit strength. Batteries submit daily strength reports to the battalion S1, who forwards a battalion consolidated report through division artillery or field artillery brigade to the division or corps adjutant general. Casualty feeder reports, to include witness statements, are also processed by the battalion S1 and forwarded directly to the adjutant general in accordance with established procedures. These reports, together with authorized position vacancies, are the basis for requesting individual replacements.

Normally, the S1, in coordination with the battalion executive officer, determines assignments for individual replacements. For critical skills, the S3 or commander may establish assignment priorities.

In an active nuclear environment, the battalion S3 is responsible for determining a unit's potential to operate in an area contaminated by radiation. He does this by comparing radiation damage reports submitted by battalion units with the operational exposure guidance (OEG) established by the battalion commander. The amount of radiation exposure previously suffered by individual replacements may also influence unit assignments.

Personnel services. Leaves, passes, command information, postal service, religious activities, exchanges, financial service, legal assistance, welfare, special services, and rest and relaxation maintain morale. The battalion commander is responsible for insuring these services are fairly and impartially provided to his soldiers.

Collection, identification, safeguarding personal effects, and evacuating dead from the battle area. These activities are monitored by the battalion S1. Remains are placed in pouches by either medical evacuation (MEDEVAC) teams or aid station personnel. Dead are evacuated with their personal effects to a graves registration collection point using available transportation.

Personal effects found on the body are never removed. Personal effects in a unit storage are quickly screened, inventoried, and forwarded to appropriate graves registration elements. Military equipment found with the remains or in unit storage is turned in to the battalion S4. If battlefield conditions do not permit immediate evacuation, remains are left at a location designated by the S1 for subsequent evacuation. Isolated and mass burials are performed only when authorized by appropriate authority. In either case, complete information, including overlays, must be forwarded through channels to the appropriate agency.

Prisoners of war. The S1 has staff responsibility for handling of prisoners of war (PW). He coordinates with the S3 for guards to evacuate prisoners, the physician's assistant (or surgeon) for treating and evacuating wounded prisoners through medical channels, and the headquarters battery commander for guarding PWs at the collection site. The PW collection point is usually at a trains location. PWs are evacuated as directed by higher headquarters.

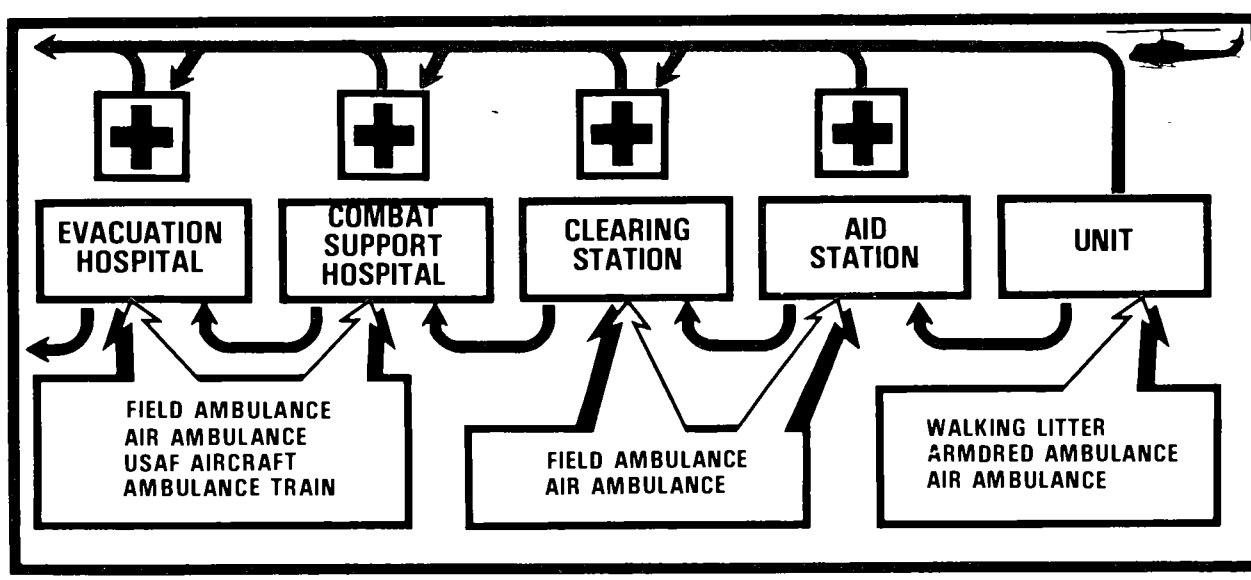
Medical support.

Medical support within the battalion is provided primarily by the medical section. The section operates the battalion aid station, which is located as far forward as the tactical situation permits.

Each battery is provided an aidman, who administers routine or emergency medical treatment. He also insures that casualties that must be evacuated are properly prepared and moved.

Personnel with minor wounds and illnesses are treated at the battalion aid station, which is supervised by the surgeon or physician's assistant. Patients requiring further evacuation are given emergency medical treatment and prepared for movement.

Patients evacuated from the battalion go to the division clearing station providing area medical support. Depending upon how serious their wounds are, casualties may be moved directly from the battery position to the clearing station or to a corps combat support hospital by division or corps ambulance, normally aerial. The battalion aid station requests and monitors aeromedical evacuation. Batteries should also be knowledgeable of MEDEVAC request channels. The general evacuation process is shown below.



Note. Any medical facility may be bypassed when condition of patient warrants and the evacuation means permit.

Commanders and battalion medical personnel are responsible for training soldiers in first aid procedures and insuring proper hygiene and sanitation. Command emphasis placed upon immunizations, mess sanitation, field sanitation, and good safety practices will significantly reduce the battalion's losses due to nonhostile casualties.

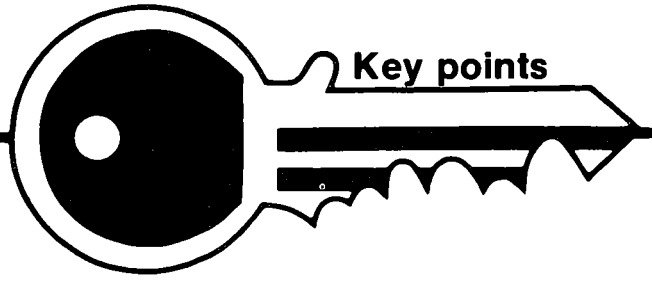
Other services.

Transportation. Additional transportation may be required to supplement the battalion's organic resources for such requirements as hauling additional class III and class V supplies, moving large amounts of barrier materials, evacuating

damaged materiel, and accomplishing administrative movements. Requests are forwarded through S4 channels to the division transportation officer (DTO) for divisional battalions or to the COSCOM movement control center (MCC) for nondivisional battalions.

Bath and clothing exchange. Bath and clothing exchange service may be requested from the divisional chemical defense company or the supply and service battalion in the COSCOM support group.

Laundry. Laundry service is provided by the COSCOM—field service general support companies forward for divisional batteries and direct support supply and service companies for nondivisional battalions.



Key points

- **The cannon battalion must receive responsive combat service support.**
- **This support must be as mobile as the cannon battalion and must be well forward.**
- **The cannon battalion has a personnel administration center, medical section, communications platoon, supply section, maintenance section, and ammunition trains.**
- **Service support elements may be grouped at a single location (unit trains) or at dual locations (combat trains and field trains).**
- **Maintenance is performed at the lowest level capable of repair.**

CHAPTER 6:

How to Train to Fight

This chapter tells the cannon battalion commander and staff how to train the battalion to fight. A cannon battalion can provide accurate, responsive, effective support *only* if it has been trained to do so.

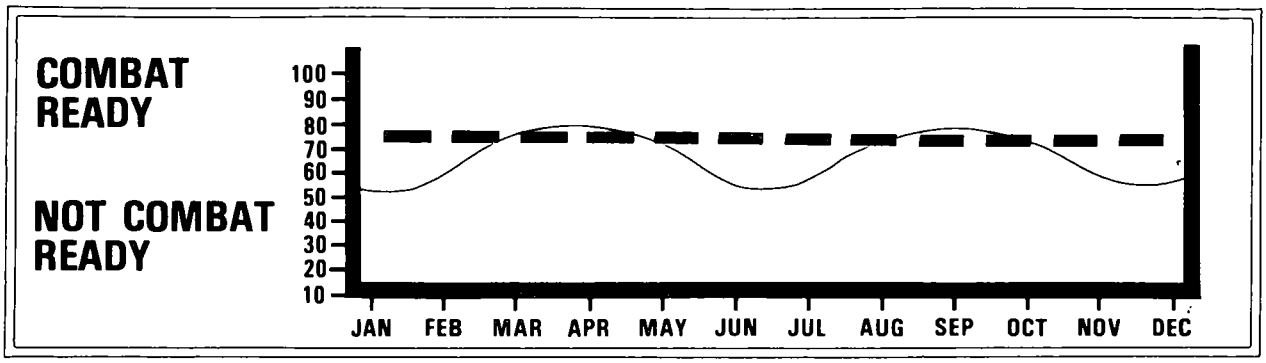
When not in combat, *training* is the Army's *number one* priority. Training must receive the personal commitment of every leader. This means that the battalion commander, all officers, and all noncommissioned officers must accept the statement that training is the number one priority and direct their energies toward making that a reality.

Training philosophy.

To defeat an enemy proficient in the art of war who has the capability to employ devastating firepower and massive numbers of men and equipment, the battalion commander and staff must exact the maximum capability from their soldiers and equipment. The challenge to confront such an enemy may come at any time. To meet this challenge, the battalion must *achieve* and *maintain* the highest possible proficiency levels. Units can no longer afford to "peak" for one particular event and then fall off combat readiness. This practice produces units that are ready for combat for only brief periods during the year. To be ready to perform its combat mission, a unit must train as it will fight—and train continually. Reliance on lock-step methods, classroom-type instruction, and cyclical testing programs is not the way to get a unit combat ready.

> "The best form of welfare for the troops is first-class training."
>
> —GEN Erwin Rommel

TYPICAL PROFICIENCY CURVE OF AN ORTT-DRIVEN BATTALION



To be combat ready, training must be realistic, and junior officers and noncommissioned officers must be totally involved. Training should be initiated with mission-type orders, which need have only three parts:

1

What is to be done—what the commander issuing the order expects to be accomplished.

2

What is not to be done—what controls, limits, or constraints the commander issuing the order considers necessary to impose on his subordinates, primarily for the purpose of coordinating their actions.

3

What resources are available to accomplish the task.

Note the absence of the word *how*. The fundamental difference between *what* and *how* is the key to understanding the mission-type order. Often there is a tendency to prescribe how the job should be done—to embellish an order. Too often a broad mission-type order issued at higher headquarters becomes a detailed "how to do it" by the time it reaches the trainer. This tendency should be avoided because it stifles the trainer's initiative and tends to detract from imaginative and realistic training. Battalion commanders tell battery commanders *what* is to be done—battery commanders are responsible for determining *how* to accomplish the mission.

"Sergeants are leaders. Sergeants' business is leadership. Therefore,the sergeants must be trained as leaders—not as administrators. For the cement that bonds together good weapons, sound tactics, and effective organizations into winning battle teams is training—training to develop excellence in the skills of leaders and soldiers, to the end that they have both the capability to fight the tough battles and win, and the conviction that they can and must fight hard and well, and that, if they do, and have a little luck, they'll win against all odds."

—GEN Donn A. Starry

Training materials.

Training effectiveness can be enhanced by using training materials effectively. These materials, properly used, can help solve problems created by a limited-resource environment. Some examples are:

Commander's (supervisor's) manual. The commander's manual provides a complete list of critical tasks for each military occupational specialty (MOS), skill levels 1 through 4. The list identifies tasks, gives references, and indicates where a soldier receives training for each task. This document can assist the training manager in developing a systematic approach to individual training by MOS in the unit. Each task is identified as either being taught through formal schooling such as:

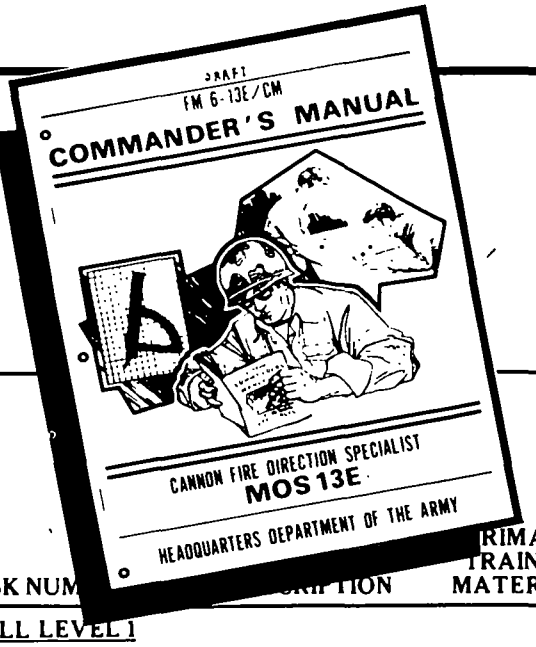
Basic combat training (BCT).

Advanced individual training (AIT) (one-station unit training (OSUT)).

Basic noncommissioned officer course (BNCOC).

Primary noncommissioned officer course (PNCOC).

Or being taught through supervised on-the-job training (SOJT). SOJT tasks are a unit training responsibiity. AIT-taught tasks that are not practiced on the job require scheduled refresher training.

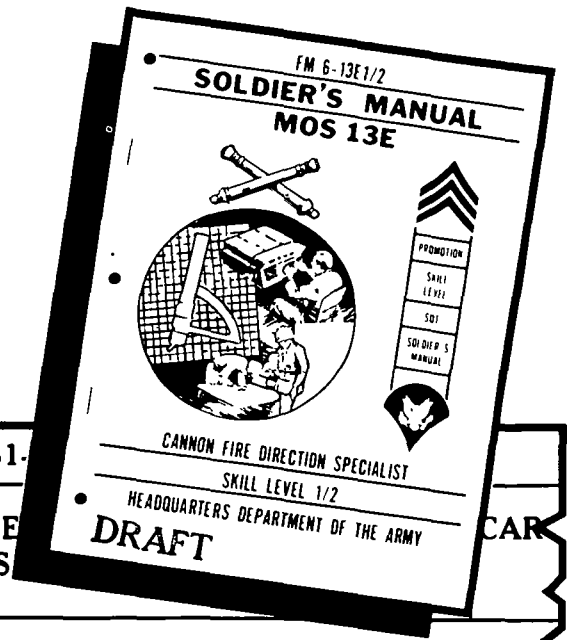


For example, the commander's manual for 13E lists "prepare surveyed firing chart" as a critical task on page 2-2, lists FM 6-40 and training extension course (TEC) lessons as references, and indicates that a soldier receives this initial training at AIT. It also tells where refresher training should be done.

TASK NUM	DESCRIPTION	PRIMARY TRAINING MATERIALS	INITIAL TRAINING LEVEL	INSTITUTION: BCT	AIT/OSUT	PNCOC	BNCOC	ANCOC	SGMA	SERVICE SCHOOL	UNIT: SOJT	SELF STUDY	SCHEDULED TRAINING
SKILL LEVEL 1													
CHAPTER 2: COMMON TASKS													
SECTION 1: MANUAL FIRE DIRECTION PROCEDURES													
061-280-1000	Prepare and Transmit Messages to Observer	FM 6-30 FM 6-40	1		Q						A	A	A
061-280-1001	Prepare a Surveyed Firing Chart	FM 6-40 TEC Lessons 250-061-6301-F thru 250-061-6304-F	1		Q			A			A	A	A

Soldier's manual. The soldier's manual is the single most important field manual the individual soldier has. It is also an important training tool for the trainer and the training manager. The soldier's manual tells the soldier (by skill level) specifically what he must be able to do in his grade and MOS. It contains tasks peculiar to a given MOS and duty position and common tasks required of all soldiers regardless of MOS, such as first aid.

The soldier's manual is the individual soldier's personal job reference; it is the trainer's basis for training and evaluating training; and it is the training manager's yardstick for measuring each soldier's proficiency.



FM 6-13E1/2 081-831-

PERFORM MOUTH—TO—MOUTH RE CAR
DIAC MAS

CONDITIONS

Given an unconscious casualty who has stopped breathing and has no heart-beat.

ply mouth-to-mouth resusitation and external heart massage lty resumes breathing or until you are lie relieved.

TRAINING

eathing (artificial respiration).

method is used except when soldier has a crushed face or is in ment.)

ith soldier lying on back, position yourself at side of his head.

b. Place one hand behind his neck to keep his head in a face-up, tilted-back position. Pinch his nostrils with thumb and index finger of other hand and let same hand press on his forehead to keep head tilted backward.

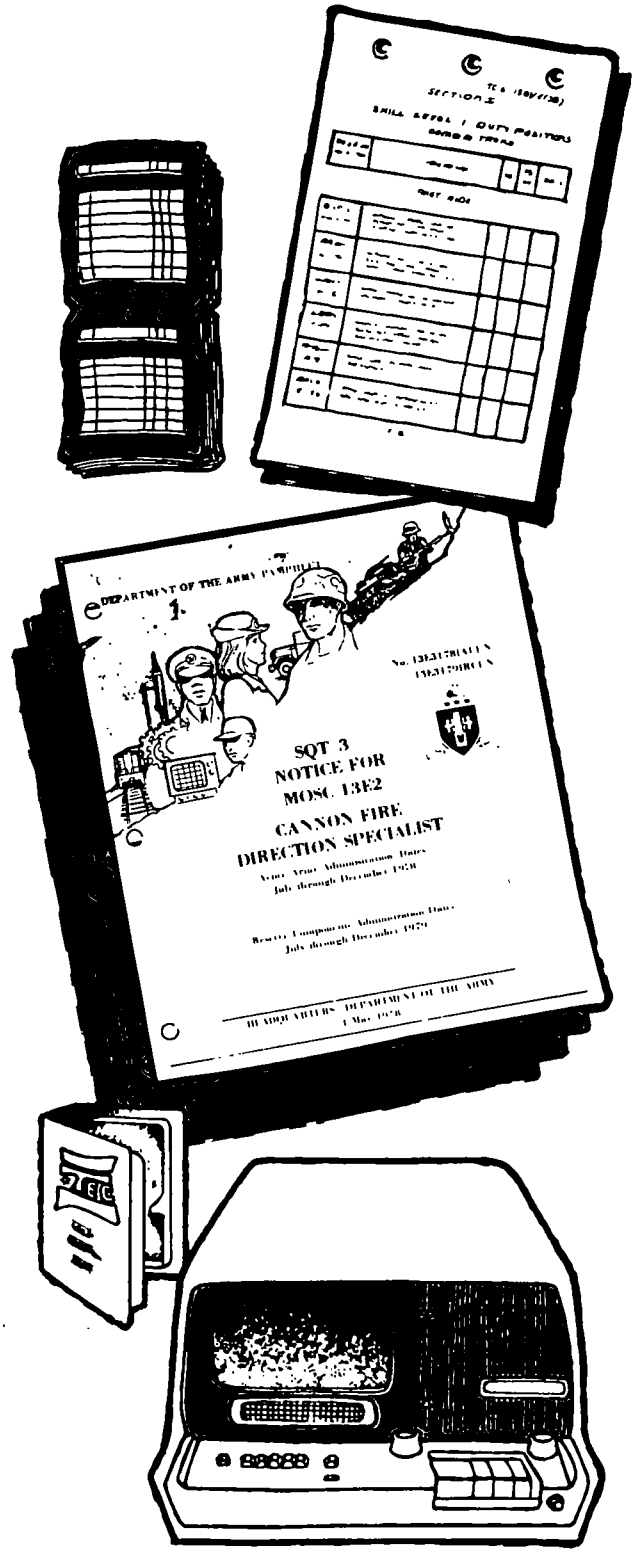
NOTE: For adults: First 4 breaths - Full and quick; thereafter - 1 every 5 seconds.

Job book. The job book is a record of proficiency maintained by supervisors on each soldier by MOS. Tasks listed in the job book are identical to those listed in the respective soldier's manual. The job book contains common tasks as well as duty position tasks. It is a record of each soldier's proficiency in his present duty position and is the primary working document for firstline supervisors as they train the individual soldier.

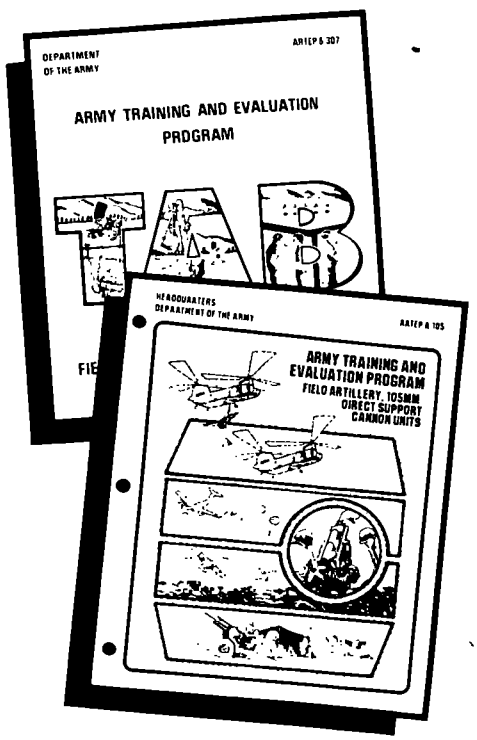
Skill qualification test. The skill qualification test (SQT) determines the soldier's proficiency in his current skill level and his qualifications for advancement to the next higher skill level. The SQT emphasizes hands-on performance. Using SQT results, leaders can determine individual training weaknesses and group weaknesses within the unit by MOS.

Record SQTs are taken once every 2 years (unless the soldier fails to verify in his current skill level or he voluntarily selects to be retested annually). This means that testing selected soldier's manual tasks may be required periodically to provide feedback on the current individual training status in a unit. Also, unit-administered individual evaluations such as those presented in appendixes C and D of FM 6-50 are valuable in maintaining proficiency.

Training extension courses. TEC audiovisual lessons provide training for soldiers in common, branch-related, or MOS-related subjects. TEC lessons are designed to permit soldiers to study individually at their own speed or with a small group that has the same training need. TEC tapes and the Beseler audiovisual device can form the core of a battalion learning center.



Army training and evaluation program. The Army training and evaluation program (ARTEP) tells battalion personnel *what* they must be able to do to accomplish their collective mission. ARTEP requirements are written as performance-oriented training objectives with a measurable or observable standard. Using the ARTEP, performance can be evaluated, weaknesses identified, and training programs developed to correct deficiencies.



ARTEPs are designed for collective training rather than individual training. The ARTEP is a "continual" training program with specific performance objectives, and there is no requirement for an annual formal evaluation. Field artillery ARTEPs are the *primary* diagnostic training tools for section, battery, and battalion level training.

TRAINING TIP

An ARTEP user should distinguish immediately between section outlines (e.g., cannon section) and major mission operation outlines (e.g., battalion tactical operation). Section outlines include tasks that individual sections can use to train—usually *independently*. Major mission outlines include tasks for the entire unit (e.g., the battalion).

The ARTEP is also the starting point for combined arms training. Fire support teams and fire support officers, when training with their maneuver counterparts, should train to ARTEP standards.

Service school instructional material. The United States Army Field Artillery School (USAFAS) publishes the *Field Artillery Catalog of Instructional Material,* which lists the following material available to support field artillery training:

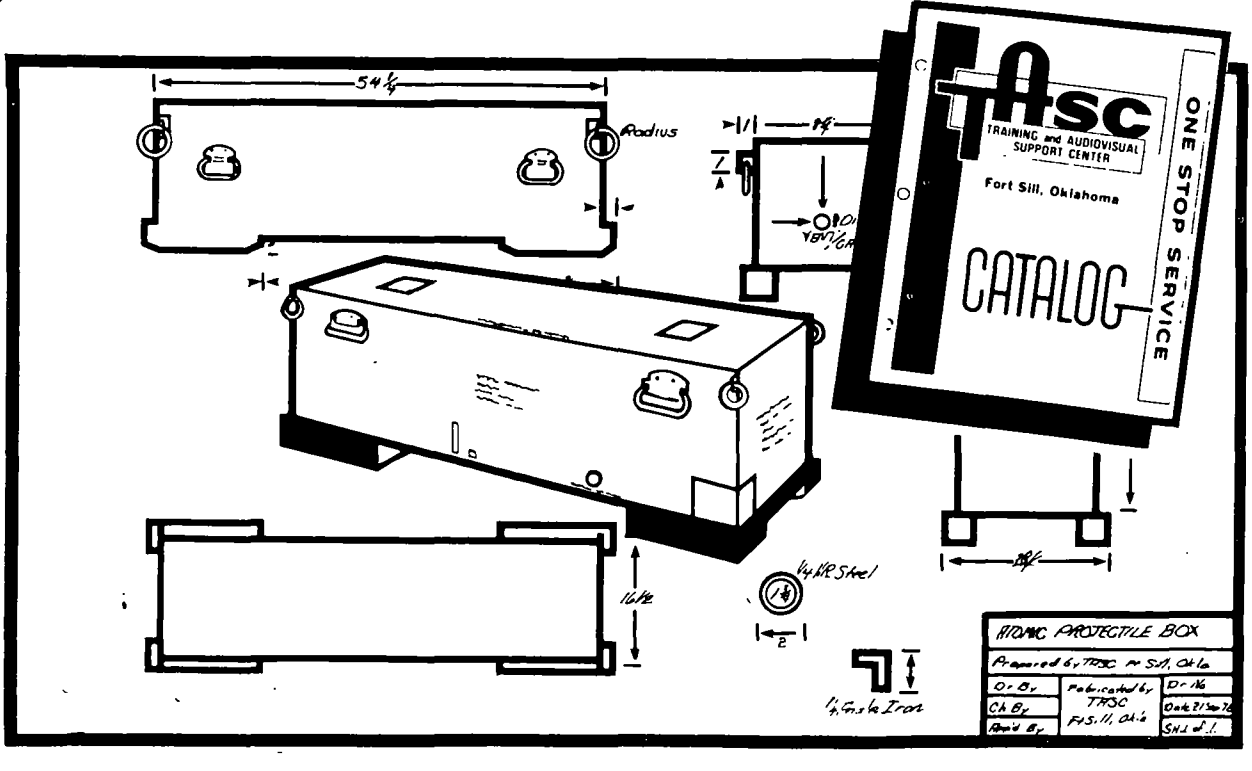
- Individual, section, staff, unit, or MOS-related courses. Subject matter includes communications and electronics, counterfire, gunnery, tactics and combined arms, and weapons.
- Programed texts on specific subjects (e.g., battalion survey planning, observed fire procedures, and simultaneous observation) that can be used to supplement training.
- Approximately 200 "how to" TV tapes that discuss, for example, adjusting field artillery and mortar fire, constructing firing charts, and the responsibilities established by field artillery missions.
- Professional development correspondence courses for officers and noncommissioned officers (NCO).

- These include officer's basic and advanced courses, nuclear target analysis, NCO cannon basic and advanced courses, and various specialty courses.
- Correspondence courses for individual soldiers needing supplementary study materials on subjects such as care and handling of artillery ammunition and firing battery operations.

To obtain copies of this catalog, write to:
COMMANDANT
US ARMY FIELD ARTILLERY SCHOOL
ATTN: ATSF-CR-TS
FORT SILL, OK 73503

Professional development courses. AR 351-1 outlines the professional development program for soldiers and noncommissioned officers. Attendance at these courses by a maximum number of qualified personnel from the battalion will improve individual skills, training skills, and unit combat readiness.

Training and Audiovisual Support Center. The local Training and Audiovisual Support Center (TASC) can provide audiovisual aids, graphic training aids, and training support items to battalion trainers. The TASC publishes a catalog listing available materials for each post or area. For example, the prescribed nuclear load (PNL) mockup boxes used to simulate realistic PNL containers for training can be obtained through the TASC. TASC has the capability to build training support items based upon design or blueprints provided by units.



Devices and simulators. Using TOE equipment and live firing for training is not always possible or desirable. Therefore, devices and simulators must be used to augment training. Devices and simulators can *replace* some live fire field training, compensate for resource or area constraints, and supplement live fire training periods. The training manager or trainer determines the best mix of live training and simulation based on his available resources and the unit's training status.

SOME AVAILABLE TRAINING DEVICES AND SIMULATORS

The M31 (14.5-mm) field artillery trainer provides realistic training for fire direction sections, forward observers, survey teams, and howitzer sections at low costs. The M31 is effective for diagnosing training weaknesses and developing teamwork and technical proficiency before firing service ammunition.

The artillery direct fire trainer M55 will provide howitzer crews with a means to train in direct fire procedures. The M55 is an inexpensive method for developing and sustaining the coordination skills required in direct fire procedures. One artillery direct fire trainer (ADFT) kit is issued per battalion.

Maneuver-oriented wargames can provide FIST chiefs and FSOs an excellent opportunity to train with other members of the combined arms team. An in-depth discussion of this subject can be found in FM 6-20, *Fire Support in Combined Arms Operations*, chapter 7.

Responsibilities.

Training responsibilities are established by commanders. This requires commanders and *all unit leaders* to be well trained and abreast of current training techniques and tactical doctrine. It means active supervision and leadership emphasis are essential to execute the unit's training program. Within the battalion, responsibilities should be divided between the training manager (battalion commander) and the trainers.

Training manager. TC 21-5-7, *Training Management in Battalions,* addresses how the battalion commander manages training within the battalion. His responsibilities are to—

- Set training goals and priorities and allocate resources to support battery or section training plans.
- Train the staff and battery commanders.
- Understand and properly use training materials.
- Know the skill level distribution by MOS in the unit.
- Establish training programs for the unit.
- Establish a systematic method of feedback on training progress.

Trainers. The trainer's responsibilities are to—

- Prepare and plan challenging and realistic training.
- Conduct training.
- Continuously evaluate the training proficiency of the unit, section, or soldier and develop training to eliminate deficiencies.

The principal trainer is the NCO who is *the* man in the Army responsible for the training of the individual soldier. The trainer is the doer. Training must be hands-on and performance oriented. The trainer must understand and be able to perform *every task required of his subordinates.* His key references are FM 21-6, *How to Prepare and Conduct Military Training,* the appropriate ARTEP, and soldier's manuals.

Training management.

The Army training management system is the framework within which a battalion is trained. The training management system incorporates training concepts, responsibilities, and tools and is designed to *achieve* and *sustain* a high state of training readiness. This management system is responsive to individual and collective training needs. It is a multistep process, and each step is supported by training materials and resources.

Training management is a *continuous* process of *evaluating* current proficiency and identifying shortfalls, *planning* the training necessary to achieve desired proficiency, and *conducting* realistic *training*. Throughout this process, feedback is used to monitor the program and make adjustments.

Battalion training.

Fundamental requirements. A successful training program can start only after two fundamental requirements are accomplished:

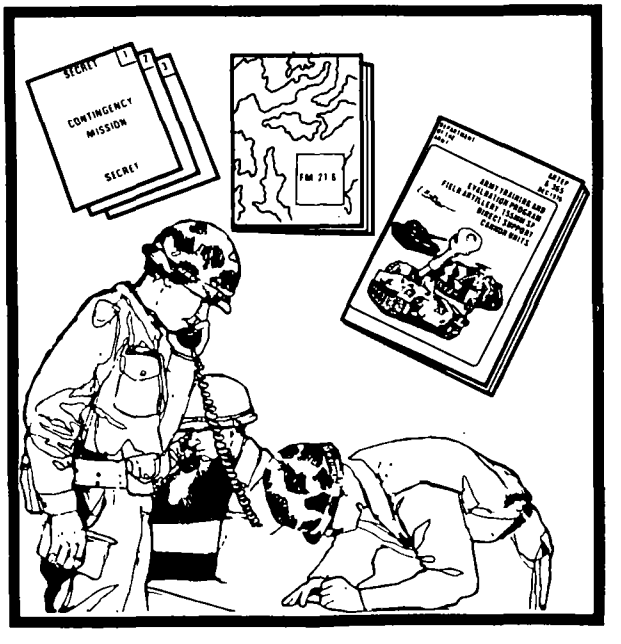
(1)

Training managers must know exactly what tasks are required to be mastered. This includes tasks from the soldier's manuals for each MOS and tasks required by the ARTEP for each section and unit in the battalion.

(2)

Training managers must verify that trainers in the unit can perform each task they are responsible for training. Each trainer must also know how to accomplish each ARTEP task his section must be able to perform. Trainer competence can be verified by administering diagnostic tests using soldier's manual and ARTEP tasks.

TASKS COME FROM A NUMBER OF SOURCES



When these fundamental requirements have been completely satisfied, a training program can be developed and executed.

Evaluating. The first step in developing a training program is to find out which tasks individual soldiers, the various sections and batteries, and the battalion already know how to do. Section chiefs, battery officers, and the battalion commander all evaluate training, but with different perspectives. Here are some methods for evaluating training:

Observation of task performance is normally the most frequent and effective form of evaluation the trainer can use during actual training. This gives the leader a quick and accurate picture of how well soldiers and the unit are trained.

An ***unannounced tactical exercise*** using evaluators from within or outside the battalion to evaluate the unit and its various sections using ARTEP standards can give the leader a more detailed picture of how well soldiers and units are trained.

A ***command post exercise*** not only identifies training weaknesses but enhances staff operations when used to evaluate the battalion staff. For realism, the scenarios in FM 71-1 and FM 71-2 can be used as a starting point.

Using a ***tactical exercise without troops (TEWT)*** provides for face-to-face interaction within the chain of command and does not waste troop time while the leaders are training.

Reviewing ***previous evaluation reports*** (operational readiness training (ORT), emergency deployment readiness exercise (EDRE), operation readiness evaluation (ORE), annual general inspection (AGI), nuclear surety inspection (NSI)) may indicate strengths and weaknesses that can serve as the basis for intensive training in critical operational areas.

A ***mini-SQT*** (round-robin in the motor pool) will allow assessment of individual training proficiency. It may also reveal individual weaknesses that affect the unit's overall mission. For example, if the mini-SQT indicates that cannoneers do not store ammunition properly or 13Es are not proficient in registration procedures, then an answer to a question such as "Why is the unit's registration sporadically invalid?" may have been found.

Requesting ***feedback from subordinates*** (briefings or informal chats) is critical. When a commander first arrives in a unit, the entire command has more experience in *that unit* than he does.

I wonder just what is the best method of evaluating my batteries, sections, and soldiers.

The decision on which evaluative techniques, or combination thereof, to use can be based on a subjective analysis of what the current level of training is within the battalion. If there is doubt, the place to start is with individual soldier evaluation rather than to waste ammunition and other resources on a unit or section level evaluation that only shows that the individuals are not yet competent in performing soldier's manual skills. The key point of the entire evaluation process is to make sure problems are identified and a training program is developed to correct those problems.

Planning. To develop a usable training plan, there are certain steps the manager must take:

- **Analyze training and determine echelon of training.**
- **Set priorities and allocate resources.**
- **Design a workable training standing operating procedure.**
- **Get systematic feedback of training progress.**

By analyzing evaluation results from the general to the specific, training strengths and weaknesses can be identified. From these, a list of collective and individual training objectives can be developed. The training program should be based on these objectives.

The commander *then* determines at *which echelon*—battalion, battery, section, soldier—training will be done.

One way is for the battalion commander to ***give the battery commander maximum flexibility*** to plan, organize, and train in those areas that improve unit, section, or individual task performance. This is probably best suited to a situation in which individual soldiers in the unit are competent but a collective training gap exists in ARTEP task performance.

Another way is to ***plan and organize for training along MOS lines;*** that is, group all soldiers in the same MOS within the battalion together for training. This is useful in newly formed battalions where there is no established level of individual expertise. It is also helpful for certain technical and low-density MOSs. This method provides a controlled environment with qualified subject matter experts and allows soldiers to work at their own pace. A real problem with certain MOSs such as 13E, 36K, and 63C is that often there is only one qualified NCO supervisor in the battalion and no NCO supervisors are available in the batteries for assistance and training. The *quality* of training received by soldiers in the batteries is a direct reflection of the supervisor in charge. With a key MOS such as 13E, for example, a battalion cannot afford to have one or two batteries unable to meet ARTEP standards because their fire direction center supervisors are not competent. The solution may be to consolidate this training under the supervision of the battalion's technical fire direction expert. In most instances, however, the preferred method is to let the section leader do the training.

A third way is to ***combine the two ways*** just discussed. That is, some MOSs, such as 13E, are consolidated under the supervision of the battalion chief computer; while other MOSs, such as 13B, are under the supervision of the battery commander.

The particular method chosen depends upon the situation. The important point is to select a method that is the most efficient and effective and that will close training gaps. The keystone of this process is to keep striving for the overall objective: sections and batteries—a battalion—that can perform ARTEP tasks.

To focus attention on unit training needs, the commander *sets priorities* and *allocates resources*. He looks for weaknesses that are recurring and that are requisite building blocks for a well-trained unit. For example, if the unit has faulty registration procedures, this will impact on a variety of other tasks such as fire-for-effect missions, irregularly shaped targets, and, in general, the accuracy of any fires. Thus, teaching registration procedures should carry a high priority in the commander's plan.

BATTALION COMMANDER'S KEY RESOURCES

Soldiers
Time
Funds (ammunition, fuel, PLL)
Training materials and areas

Designing a functional training SOP insures that both managers and trainers know what is expected of them. It is vital that a command have an organized system for planning and programing training. This can be accomplished in any number of ways. A suggested method would be to outline on a milestone schedule specific items required to produce effective training. For example, 3 weeks before a designated training period, a command should confirm ranges and training areas, set up a rehearsal schedule, and brief all leaders and instructors on what the training objectives are. Two weeks before training, rehearsals should be conducted, backup training planned, and the troops briefed. The week before training should be reserved for adjusting the planned training. While this approach may not be suitable to every unit, it is a *systematic* approach to *programing* training.

Another important step in the planning process is to *design a feedback* or *management information system* so the manager can manage training—and know what is going on. Currently, there is no requirement for *any* training records. However, the training manager must be able to account for training progress.

He can do this several ways. One way is by continually and informally evaluating the training done by unit leaders. Another method is for each

UNIT: Battery A
MAJOR MISSION OPERATION: Tactical operations

Task	GO	NO GO	Date
Hasty displacement (night)		X	31 Oct
Terrain march (day)	X		31 Oct
Deliberate displacement (day)	X		7 Nov

headquarters element (battery, battalion) to chart its major mission operations and ARTEP tasks and to record progress.

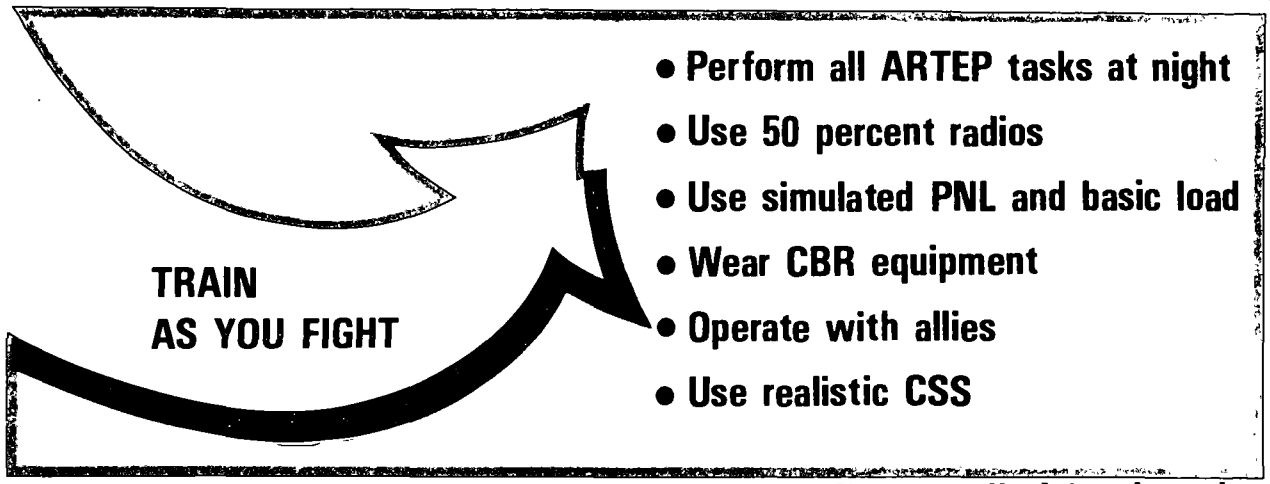
Or, firing batteries may chart the progress of their six cannon sections.

To manage individual skill information, each NCO supervisor maintains a job book for each soldier. Below is an extract from the 13E job book.

ARTEP Tasks		Emplace Cannon	Lay Cannon	Emplace Collimator	Emplace Aiming Posts	Boresight	Prefire Checks
Cannon Sections	1						
	2						
	3						
	4						
	5						
	6						

DETERMINATION OF BASIC FIRING DATA

Task	GO	NO GO	Date
-1258 (2-16) Determine basic firing data for an HE projectile with a GFT/GFT fan (fuze quick, time, and VT)			
-1259 (2-18) Determine basic firing data for an HE projectile with a GFT (high angle)			
-1261 (2-20) Construct a GFT setting and apply deflection corrections to a GFT/GFT fan			
-1262 (2-23) Determine basic firing data for a projectile with a GFT setting applied (GFT or GFT fan)			



Training. Just as fire support coordination is implementing a fire plan, training is executing a training plan based on valid training evaluations. The training can be centralized or decentralized. Regardless of the method used, training must be realistic, performance oriented, and self-paced to accommodate differences in training levels.

Performance-oriented training means that *training* and *evaluating* occur at the same time. Further, a minimum amount of time is spent talking about how to do a task, and a maximum amount of time is spent by soldiers actually doing the task. An example task is shown below.

For training, there should be a .50 caliber machinegun for every two soldiers. If there are more than eight soldiers training, assistant trainers should be present. The trainer talks the soldiers through each step of setting headspace and timing (training), allowing the soldiers to perform each step as the trainer talks. As each soldier masters the skills required, he reports to the trainer and demonstrates that he can perform the task to the standard required (evaluation). Another example task is shown below.

.50 CALIBER MACHINEGUN

Task	GO	NO GO	Date
Set and check headspace and timing on a .50 caliber HB M2 machinegun.			

CANNON SECTION

Task	GO	NO GO	Date
Boresight the cannon			

For this task, the section chief insures that each member of the section knows and understands how to do his part of the task. *The section practices the task until the standards are met,* with the trainer evaluating the section's ability to perform the task against the standard.

Self-paced or section-paced training means that individuals within a section or sections within a battery may all be training to perform different tasks at the same time. For example, if all 13E fire direction personnel are training under the supervision of the battalion chief computer, each soldier may be training to perform a different soldier's manual task based on particular weaknesses revealed by a previously administered diagnostic test. Some soldiers may be using a TEC lesson, others may be studying a field manual or a correspondence course, and others may be working in a small group using peer instruction techniques. As each soldier masters the particular task he is working on, he demonstrates his proficiency to the trainer, who verifies that the task standards are being met before the soldier goes on to the next task. In the same manner, all howitzer sections within a firing battery may be training to perform different ARTEP tasks. As each section masters the task, it demonstrates its ability to perform to ARTEP standards for the chief of firing battery or gunnery sergeant before starting to train on the next task. Tasks can be integrated into unit field training exercises (FTX) to demonstrate proficiency for other evaluators.

The training crosswalk.

There are over 500 collective training tasks in ARTEP 6-365 alone and about 280 individual training tasks in the skill level 1/2 13B soldier's manual. The number of training combinations and permutations from just these two manuals is incomprehensible. This can be complex and confusing to trainers and training managers unless they know how to use the manuals.

MAIN TRAINING POINTS

- **Understanding how to crosswalk between the ARTEPs and soldier's manuals to determine *what* and *who* must be trained.**
- **Selecting groups of individual and collective tasks to correct a training deficiency.**
- **Not becoming bogged down in trying to train to all standards at the same time.**

The ARTEP is the cornerstone because the collective tasks the *battalion must perform* relate directly to the battalion's ability to fight effectively. This is how the training crosswalk works. ARTEP 6-365, *155 SP, Direct Support Cannon Units,* and the soldier's manuals for MOS 13B, 13E, 13F, and 82C will be used as examples. It is assumed that the battalion cannot transfer outside transfer limits effectively.

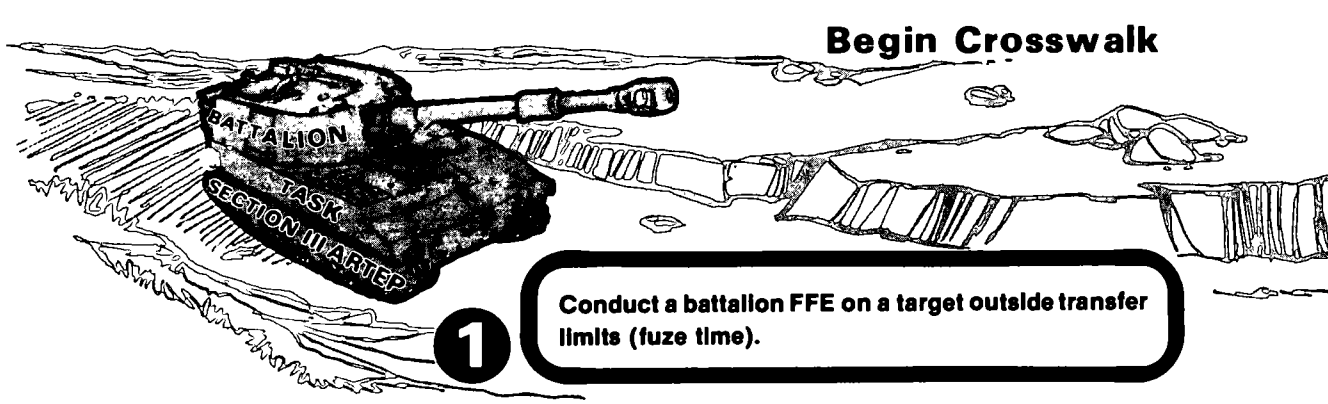
The trainer begins by referring to ARTEP 6-365, chapter 3, section III, and reading the task entitled, "Conduct a battalion FFE on a target outside transfer limits (fuze time)." This is a task that requires participation by many different people and sections in the battalion.

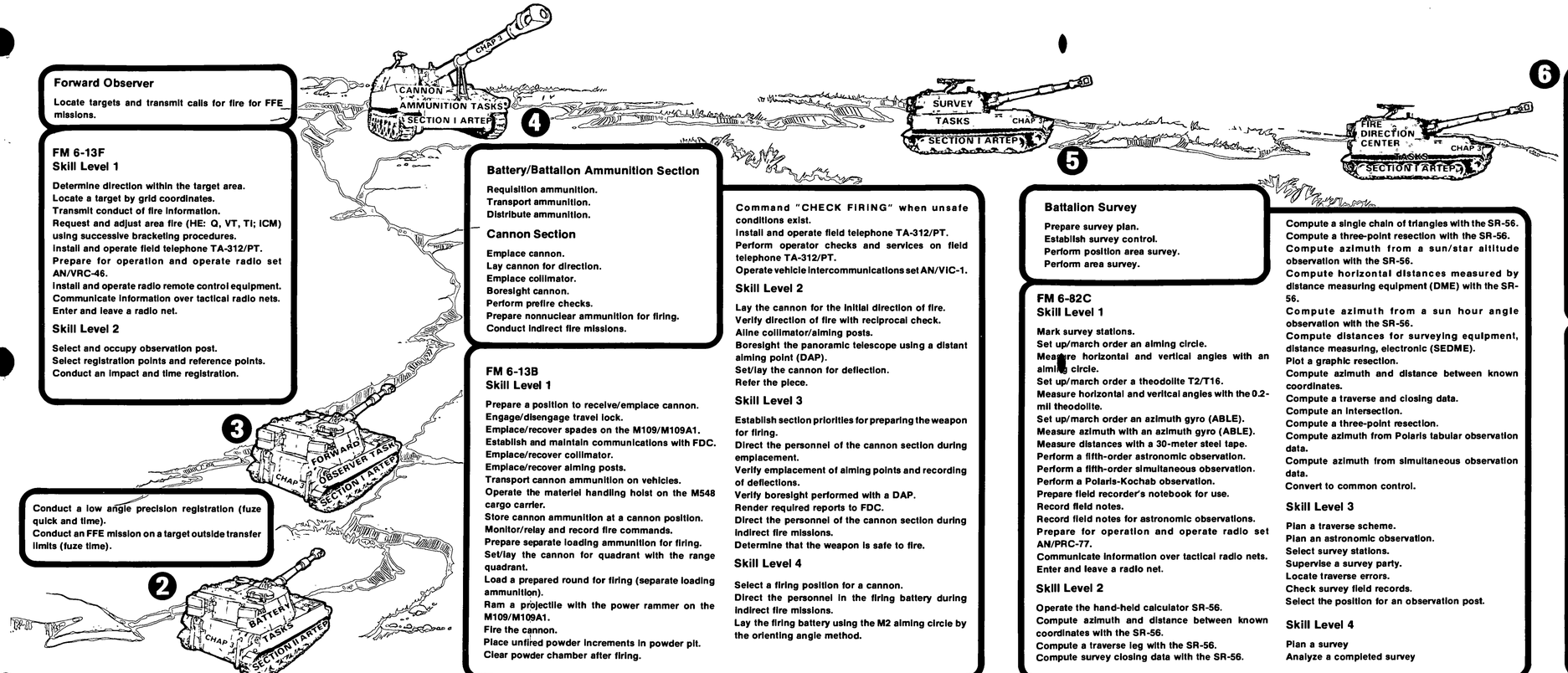
To refine further what training tasks are required, he next refers to section II of chapter 3 in the ARTEP to determine what tasks the *batteries* must perform to support the battalion task.

Next, the trainer refers to section I in chapter 3 of the ARTEP to determine what section tasks are required to accomplish the battery tasks.

At this point *all collective* tasks required to accomplish the battalion task have been identified. The final step is to review the soldier's manual for each MOS in each section that must participate in accomplishing the battalion task.

Using this process, related tasks at each echelon from the soldier to the battalion are identified. The ultimate benefit from this process is that *deliberate, coherent, effective,* and *realistic* training to correct a training deficiency can take place at every echelon *simultaneously.*





Forward Observer

Locate targets and transmit calls for fire for FFE missions.

FM 6-13F
Skill Level 1

Determine direction within the target area.
Locate a target by grid coordinates.
Transmit conduct of fire information.
Request and adjust area fire (HE: Q, VT, TI; ICM) using successive bracketing procedures.
Install and operate field telephone TA-312/PT.
Prepare for operation and operate radio set AN/VRC-46.
Install and operate radio remote control equipment.
Communicate information over tactical radio nets.
Enter and leave a radio net.

Skill Level 2

Select and occupy observation post.
Select registration points and reference points.
Conduct an impact and time registration.
Conduct a low angle precision registration (fuze quick and time).
Conduct an FFE mission on a target outside transfer limits (fuze time).

Battery/Battalion Ammunition Section

Requisition ammunition.
Transport ammunition.
Distribute ammunition.

Cannon Section

Emplace cannon.
Lay cannon for direction.
Emplace collimator.
Boresight cannon.
Perform prefire checks.
Prepare nonnuclear ammunition for firing.
Conduct indirect fire missions.

FM 6-13B
Skill Level 1

Prepare a position to receive/emplace cannon.
Engage/disengage travel lock.
Emplace/recover spades on the M109/M109A1.
Establish and maintain communications with FDC.
Emplace/recover collimator.
Emplace/recover aiming posts.
Transport cannon ammunition on vehicles.
Operate the materiel handling hoist on the M548 cargo carrier.
Store cannon ammunition at a cannon position.
Monitor/relay and record fire commands.
Prepare separate loading ammunition for firing.
Set/lay the cannon for quadrant with the range quadrant.
Load a prepared round for firing (separate loading ammunition).
Ram a projectile with the power rammer on the M109/M109A1.
Fire the cannon.
Place unfired powder increments in powder pit.
Clear powder chamber after firing.
Command "CHECK FIRING" when unsafe conditions exist.
Install and operate field telephone TA-312/PT.
Perform operator checks and services on field telephone TA-312/PT.
Operate vehicle intercommunications set AN/VIC-1.

Skill Level 2

Lay the cannon for the initial direction of fire.
Verify direction of fire with reciprocal check.
Aline collimator/aiming posts.
Boresight the panoramic telescope using a distant aiming point (DAP).
Set/lay the cannon for deflection.
Refer the piece.

Skill Level 3

Establish section priorities for preparing the weapon for firing.
Direct the personnel of the cannon section during emplacement.
Verify emplacement of aiming points and recording of deflections.
Verify boresight performed with a DAP.
Render required reports to FDC.
Direct the personnel of the cannon section during indirect fire missions.
Determine that the weapon is safe to fire.

Skill Level 4

Select a firing position for a cannon.
Direct the personnel in the firing battery during indirect fire missions.
Lay the firing battery using the M2 aiming circle by the orienting angle method.

Battalion Survey

Prepare survey plan.
Establish survey control.
Perform position area survey.
Perform area survey.

FM 6-82C
Skill Level 1

Mark survey stations.
Set up/march order an aiming circle.
Measure horizontal and vertical angles with an aiming circle.
Set up/march order a theodolite T2/T16.
Measure horizontal and vertical angles with the 0.2-mil theodolite.
Set up/march order an azimuth gyro (ABLE).
Measure azimuth with an azimuth gyro (ABLE).
Measure distances with a 30-meter steel tape.
Perform a fifth-order astronomic observation.
Perform a fifth-order simultaneous observation.
Perform a Polaris-Kochab observation.
Prepare field recorder's notebook for use.
Record field notes.
Record field notes for astronomic observations.
Prepare for operation and operate radio set AN/PRC-77.
Communicate information over tactical radio nets.
Enter and leave a radio net.

Skill Level 2

Operate the hand-held calculator SR-56.
Compute azimuth and distance between known coordinates with the SR-56.
Compute a traverse leg with the SR-56.
Compute survey closing data with the SR-56.
Compute a single chain of triangles with the SR-56.
Compute a three-point resection with the SR-56.
Compute azimuth from a sun/star altitude observation with the SR-56.
Compute horizontal distances measured by distance measuring equipment (DME) with the SR-56.
Compute azimuth from a sun hour angle observation with the SR-56.
Compute distances for surveying equipment, distance measuring, electronic (SEDME).
Plot a graphic resection.
Compute azimuth and distance between known coordinates.
Compute a traverse and closing data.
Compute an intersection.
Compute a three-point resection.
Compute azimuth from Polaris tabular observation data.
Compute azimuth from simultaneous observation data.
Convert to common control.

Skill Level 3

Plan a traverse scheme.
Plan an astronomic observation.
Select survey stations.
Supervise a survey party.
Locate traverse errors.
Check survey field records.
Select the position for an observation post.

Skill Level 4

Plan a survey
Analyze a completed survey

Firing Battery Headquarters

Lay the battery with an aiming circle.
Determine executive officer's minimum quadrant elevation (QE).
Prepare and process executive officer's report.
Prepare a firing chart.
Update a firing chart.
Determine reg corr from a low angle precision reg (fuze quick and time).
Solve a concurrent met.
Compute data on a target and transmit calls for fire for an FFE mission.

Battalion Operations and Fire Direction Center

Prepare a firing chart.
Update a firing chart.
Determine battalion reg corr from a low angle precision reg (fuze quick and time).

FM 6-13E
Skill Level 1

Prepare and transmit messages to observer.
Prepare a surveyed firing chart.
Plot targets, determine and announce chart data and angle T.
Construct terrain gun position correction (TGPC) sectors.
Determine basic firing data for an HE projectile with a graphical firing table (GFT) or GFT fan (fuze quick, time, and VT).
Construct a GFT setting and apply deflection corrections to a GFT/GFT fan.
Determine basic firing data for HE with a GFT setting applied (GFT or GFT fan).
Compute and announce site, angle of site, and vertical angles.
Complete the record of fire for low angle adjust fire (fuze quick, time, and VT).
Determine total corrections for solution of a concurrent met message.
Determine position corrections by solution of a concurrent met message.
Install and operate field telephone TA-312/PT.
Install communications wire lines.
Communicate information.
Prepare for operation and operate radio set AN/VRC-46.
Install and operate radio remote control equipment.
Communicate information over tactical radio nets.
Enter and leave a radio net.
Transmit conduct of fire information.
Prepare and operate switchboard SB-22/PT.
Determine the altitude of a point using a map.

Skill Level 2

Determine adjusted firing data from a low angle impact and time registration.
Determine and apply low angle GFT setting and deflection corr to graphical equip.
Determine a new GFT setting in transfer from a map-spotted firing chart to a surveyed firing chart.
Determine and announce firing data using special corrections.
Determine piece displacement for TGPC.
Compute and announce TGPC.
Determine and apply position corrections with an M10/M17 plotting board.
Determine and announce fire commands for a mass fire mission.
Determine firing data by solution of a met to a target.
Record the executive officer report.

Skill Level 3

Determine a battalion comparative VE, group pieces according to comparative VE, and determine base piece comparative VE.

Skill Level 4

Insure that the FDC section is prepared to perform its fire direction mission.
Insure that FDC is prepared to perform a fire mission using manual procedures.
Perform net control station duties.
Insure that communications equipment is properly installed and operated.

CROSSWALK FOLDOUT

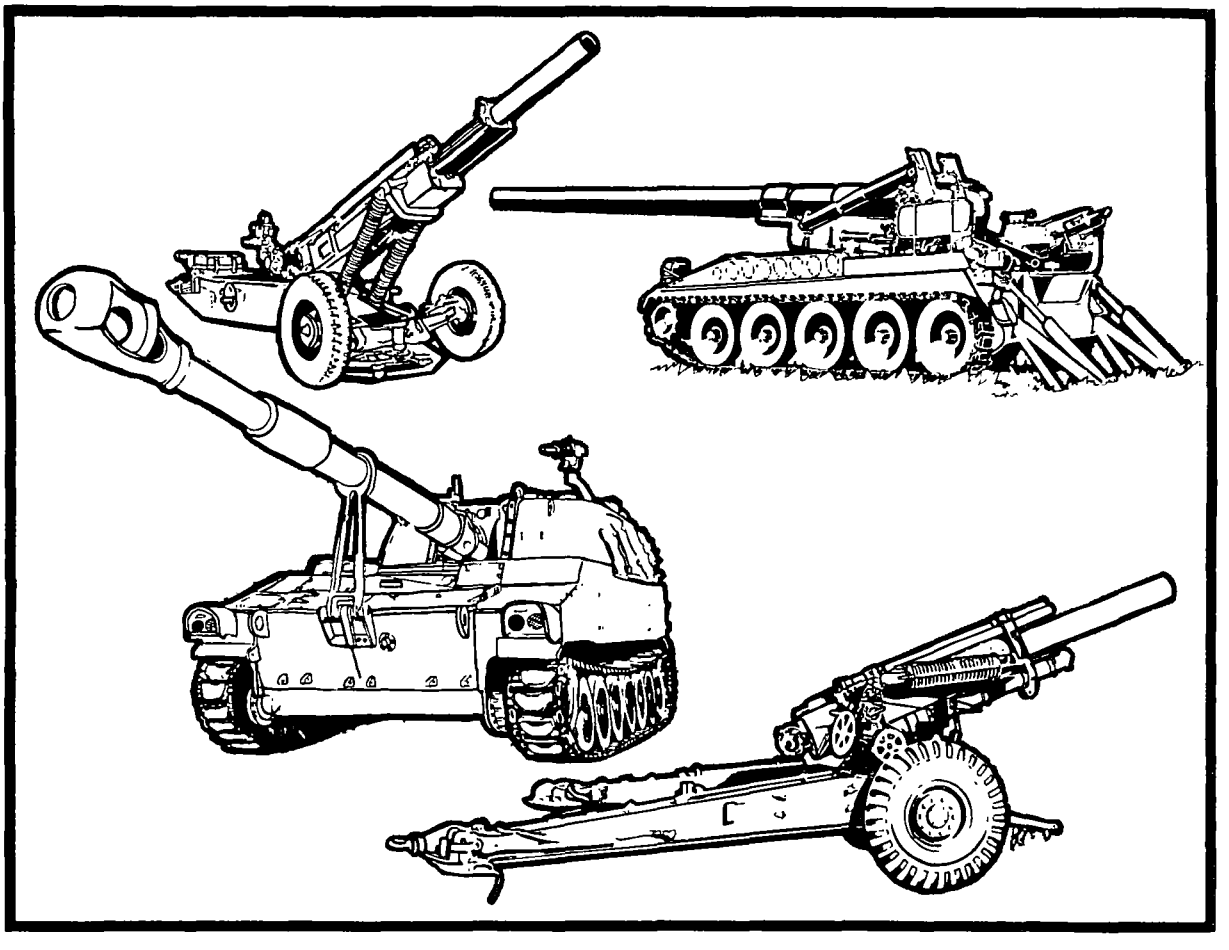
Key points

- The highest priority for the cannon battalion commander is training.
- Training evaluations must be valid.
- Training plans are based on training deficiencies determined from evaluation.
- Training is programed and executed on a systematic basis.
- Training management must be continuous to be effective.

APPENDIX A:

Divisional and Nondivisional Cannon Battalions

Divisional cannon battalions.



Cannon battalion, 105-mm (T), infantry division (fig A-1), is organized, trained, and equipped to provide nonnuclear direct support fires to a maneuver brigade, to reinforce fires of other field artillery units, and to provide general support to the division.

The 105-mm (T) battalion is organized as a self-sustaining tactical and administrative unit, consisting of a headquarters and headquarters battery, three firing batteries, and a service battery. The battalion has four fire support sections organic to the headquarters and headquarters battery—one section for the maneuver brigade and one for each of three maneuver battalions. Fire support (FS) teams for the infantry companies are also organic to the headquarters and headquarters battery to provide fire support and observer personnel at that level. Fire support sections and FISTs are

FIELD ARTILLERY BATTALION, 105-mm (T), INFANTRY DIVISION

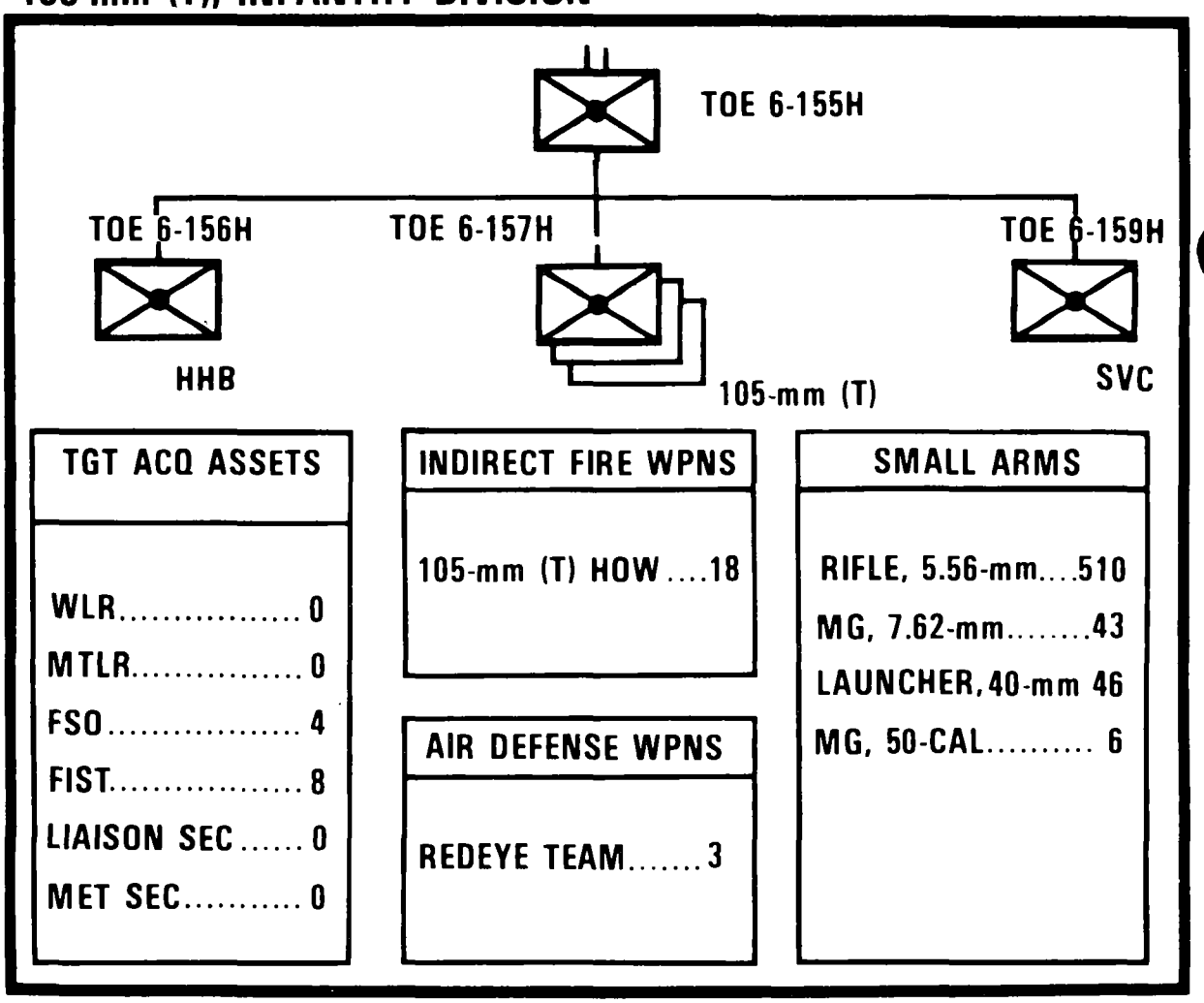


Figure A-1.

equipped by TOE with the necessary radios, vehicles, and equipment to perform fire support and observer functions.

Cannon battalion, 155-mm (T)/8-inch (SP), infantry division (fig A-2), is organized, trained, and equipped to provide field artillery fires, to include nuclear fires, in general support of an infantry division and to augment the fires of other field artillery units. The staffing of this battalion, commonly referred to as a composite battalion, is similar to that of the infantry division 105-mm battalion. The battalion has a liaison section providing the capability to establish liaison with a reinforced unit when the 155-mm/8-inch battalion is assigned the mission of reinforcing the fires of another field artillery unit.

FIELD ARTILLERY BATTALION, 155-mm (T)/8-INCH (SP), INFANTRY DIVISION

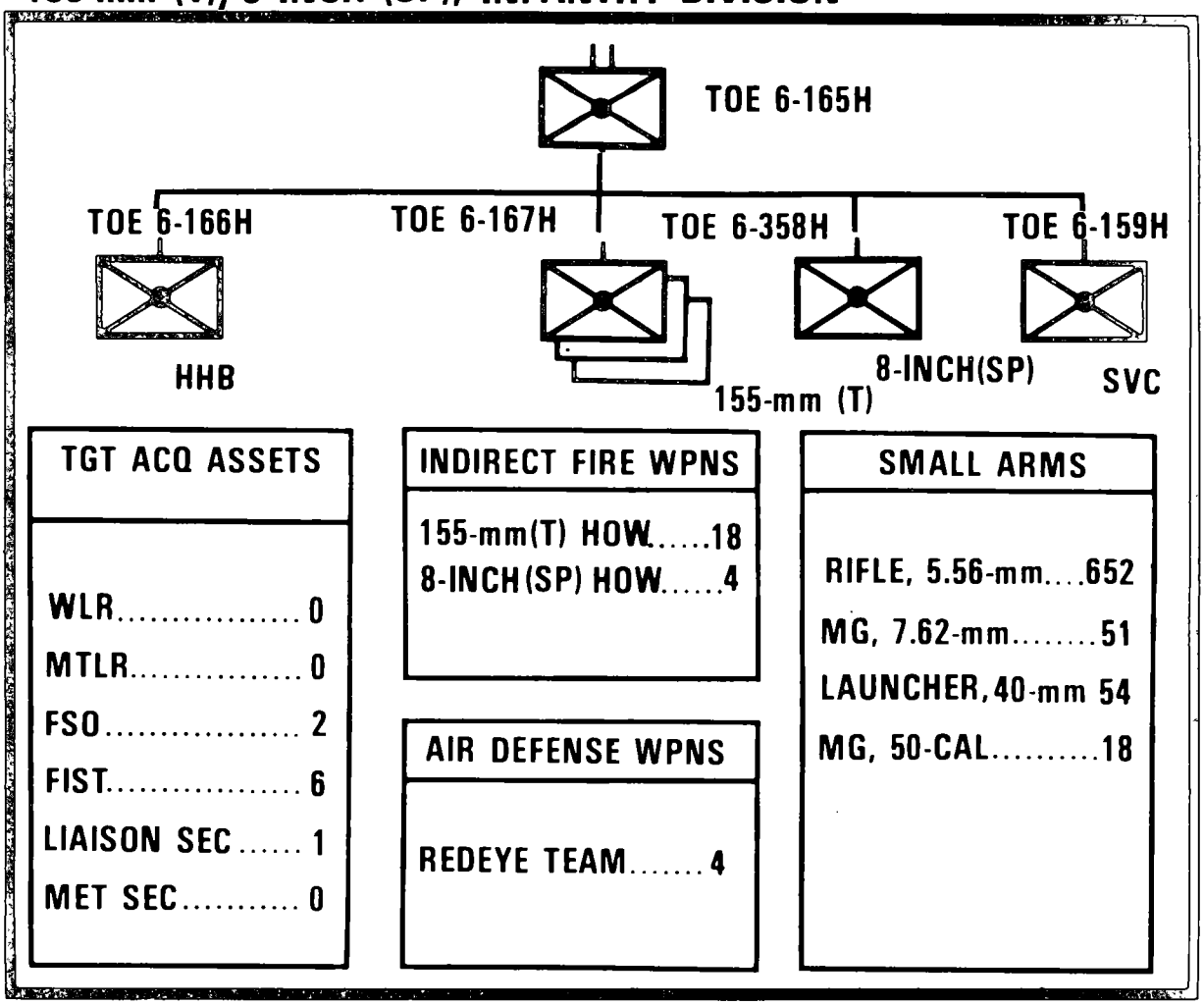


Figure A-2.

Fire support sections and FISTs for the armor battalion and the infantry (mechanized) battalion in the infantry division are assigned to this battalion by TOE.

Cannon battalion, 155-mm (SP), armored or mechanized division (fig A-3), is organized, trained, and equipped to provide direct support fires, to include nuclear fires, to a maneuver brigade and to augment the fires of other field artillery units.

The organization of the 155-mm (SP) battalion is similar to that of the 105-mm (T) battalion. Significant differences are in mobility, range, and caliber. Since the battalion is normally employed in the direct support role, it has organic fire support sections and FISTs.

FIELD ARTILLERY BATTALION, 155-mm (SP) ARMORED/INFANTRY (MECH) DIVISION

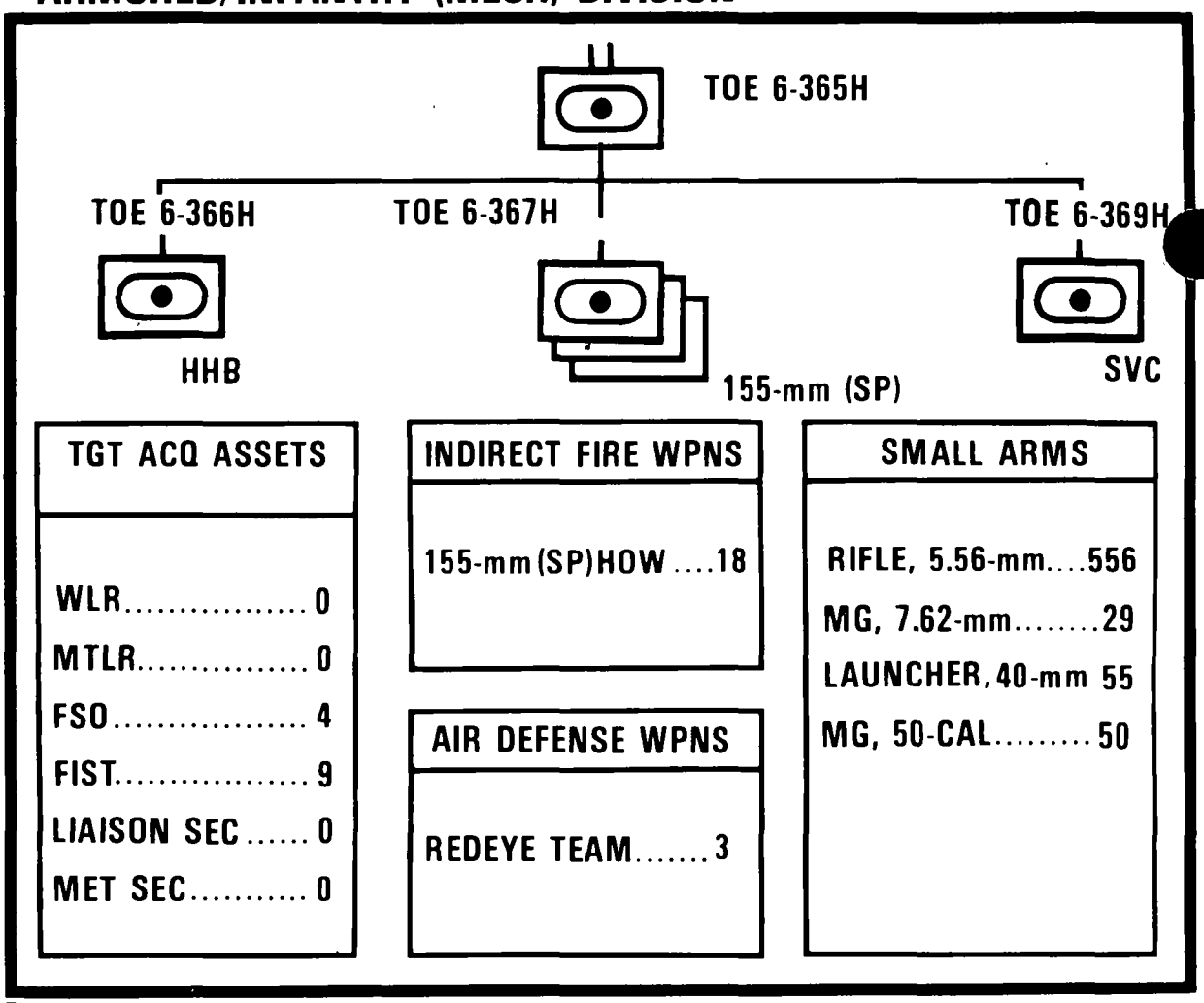


Figure A-3.

Cannon battalion, 8-inch (SP), armored or mechanized division (fig A-4), is organized, trained, and equipped to provide field artillery fires, to include nuclear fires, in general support of an armored or mechanized division and to augment the fires of other field artillery units.

The organization of this 8-inch battalion is similar to that of the 155-mm (T)/8-inch (SP) general support battalion of the infantry division. Significant differences are in the firing battery configurations. This 8-inch (SP) battalion has three firing batteries, each with four 8-inch (SP) howitzers; the 155-mm (T)/8-inch (SP) has three firing batteries with six 155-mm (T) howitzers each and one firing battery with four 8-inch (SP) howitzers. Armor divisions are authorized 11 maneuver battalions and infantry

FIELD ARTILLERY BATTALION, 8-INCH (SP), ARMORED/INFANTRY (MECH) DIVISION

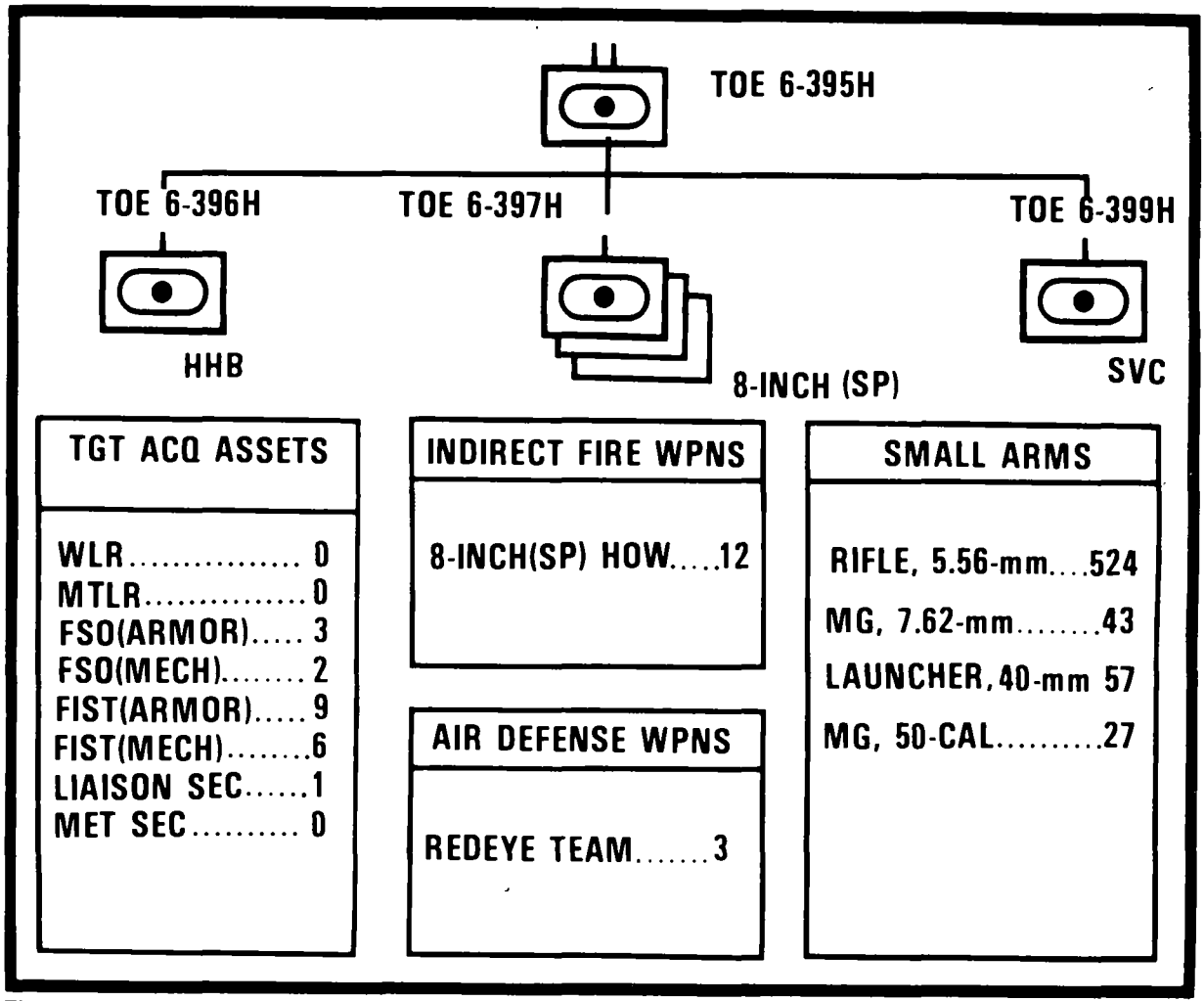


Figure A-4.

(mech) divisions are authorized 10 maneuver battalions. Fire support sections for the additional maneuver battalions (above nine) and the divisional cavalry squadron are assigned to this battalion by TOE.

Cannon battalion, 105-mm (T), airborne division (fig A-5), is organized, trained, and equipped to provide nonnuclear field artillery fires in direct support of a divisional or separate airborne brigade. Organization of this battalion is similar to that of the 105-mm (T) battalion of the infantry division. Differences in TOE result because this battalion must be capable of being completely air dropped. The headquarters and service elements of the battalion are consolidated into a headquarters, headquarters and service battery. The battalion has organic fire support sections and FISTs.

FIELD ARTILLERY BATTALION, 105-mm (T), AIRBORNE DIVISION

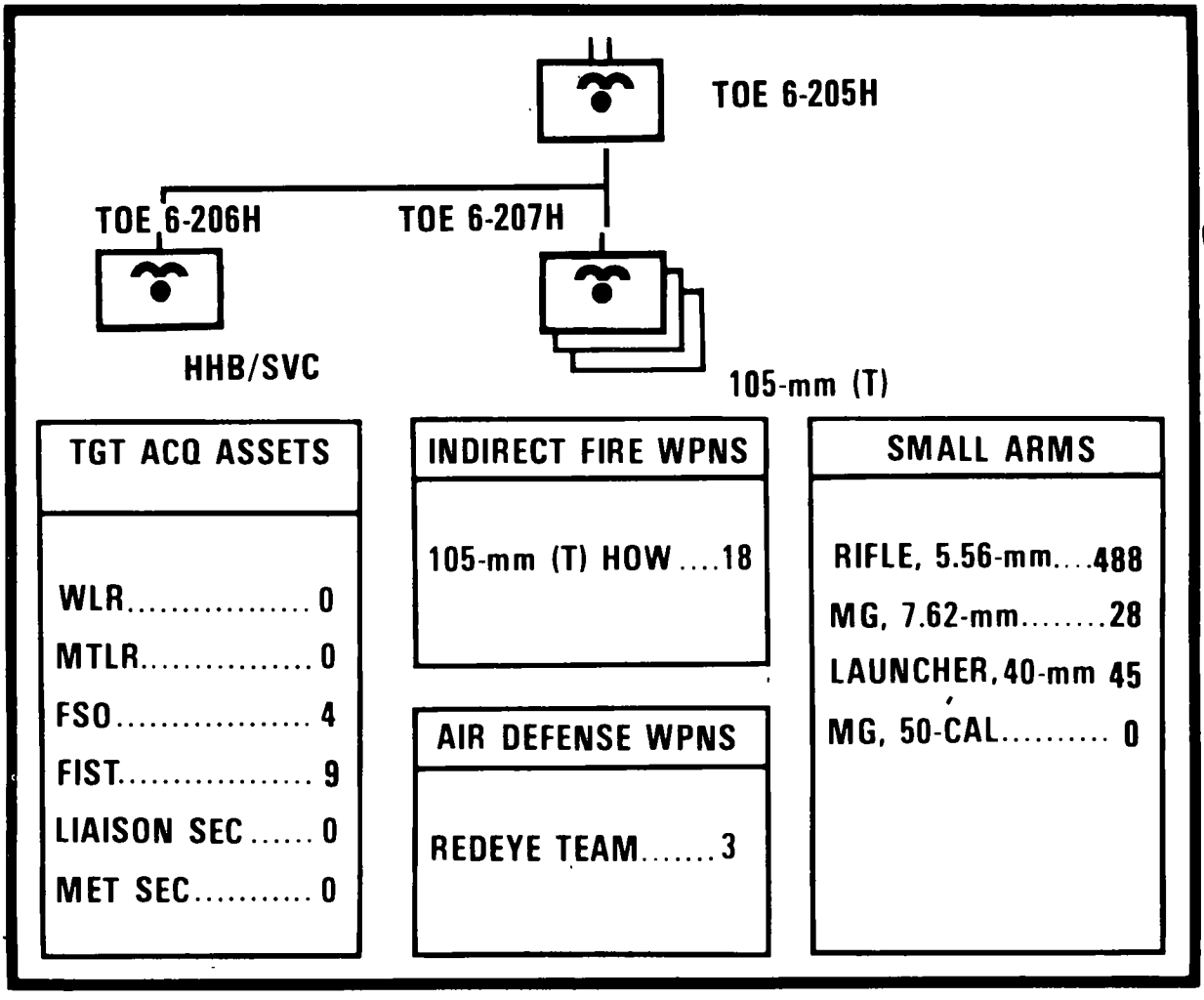


Figure A-5.

Cannon battalion, 105-mm (T), airmobile division (fig A-6), is organized, trained, and equipped to provide nonnuclear direct support to an airmobile brigade and to augment the fires of other field artillery units. The organization of this battalion is similar to that of the 105-mm (T) battalion of the infantry division. TOE differences result from the requirement that this battalion be 100 percent air transportable. The headquarters and service elements of the battalion are consolidated into a headquarters, headquarters and service battery. The battalion has organic fire support sections and FISTs.

FIELD ARTILLERY BATTALION, 105-mm (T), AIRMOBILE DIVISION

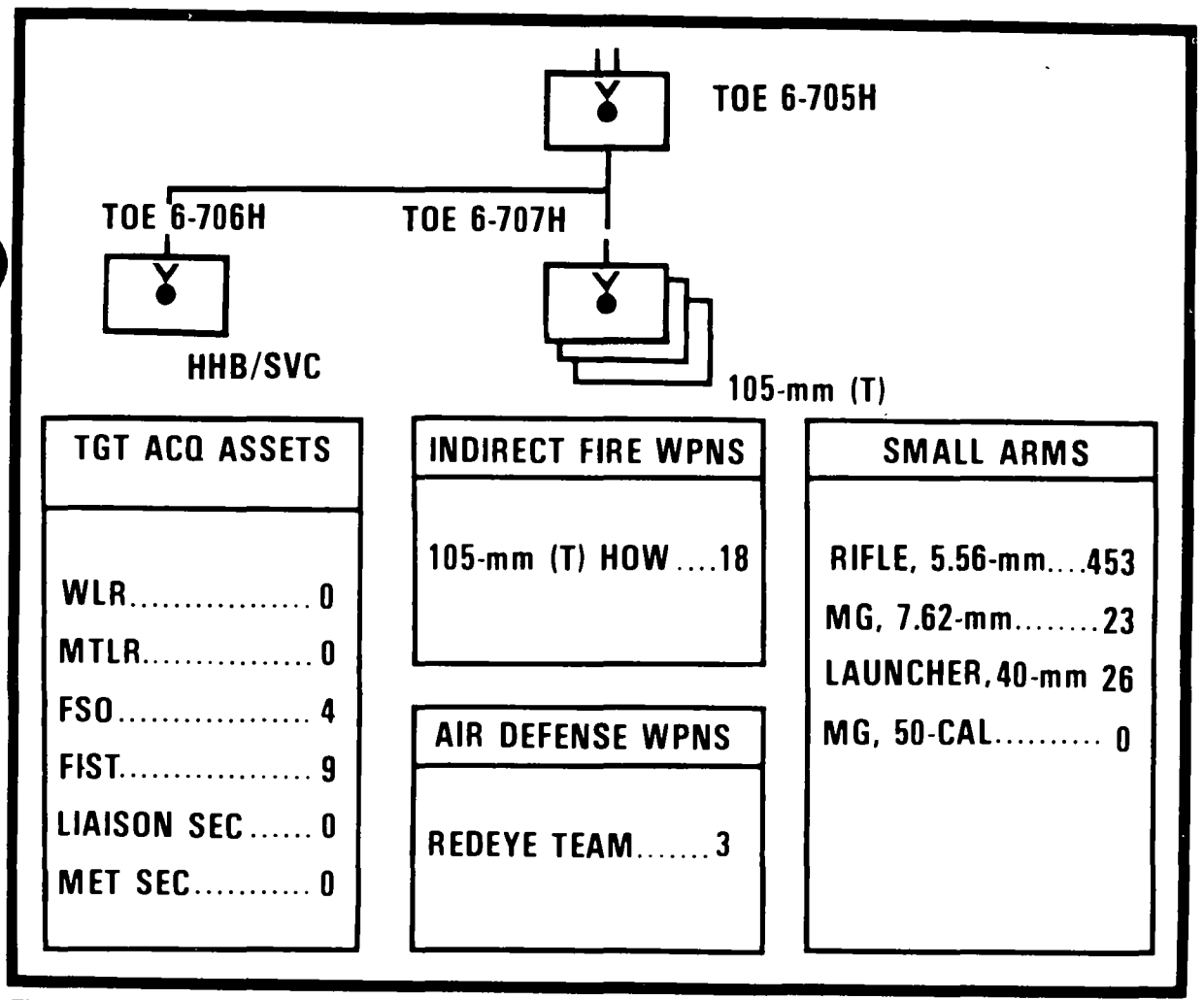


Figure A-6.

Cannon battalion, 155-mm (T), airmobile division (fig A-7), is organized, trained, and equipped to provide field artillery fires, to include nuclear fires, in general support of an airmobile division and to augment the fires of other field artillery units.

This battalion is organized similar to the 155-mm (T)/8-inch (SP) battalion of the infantry divison. Significant differences in TOE result from the requirement that this battalion be 100 percent air transportable. Consequently, there is no 8-inch (SP) battery in this battalion.

Separate brigade cannon battalions.

Cannon battalion, 105-mm (T), separate infantry brigade (fig A-8),

FIELD ARTILLERY BATTALION, 155-mm (T), AIRMOBILE DIVISION

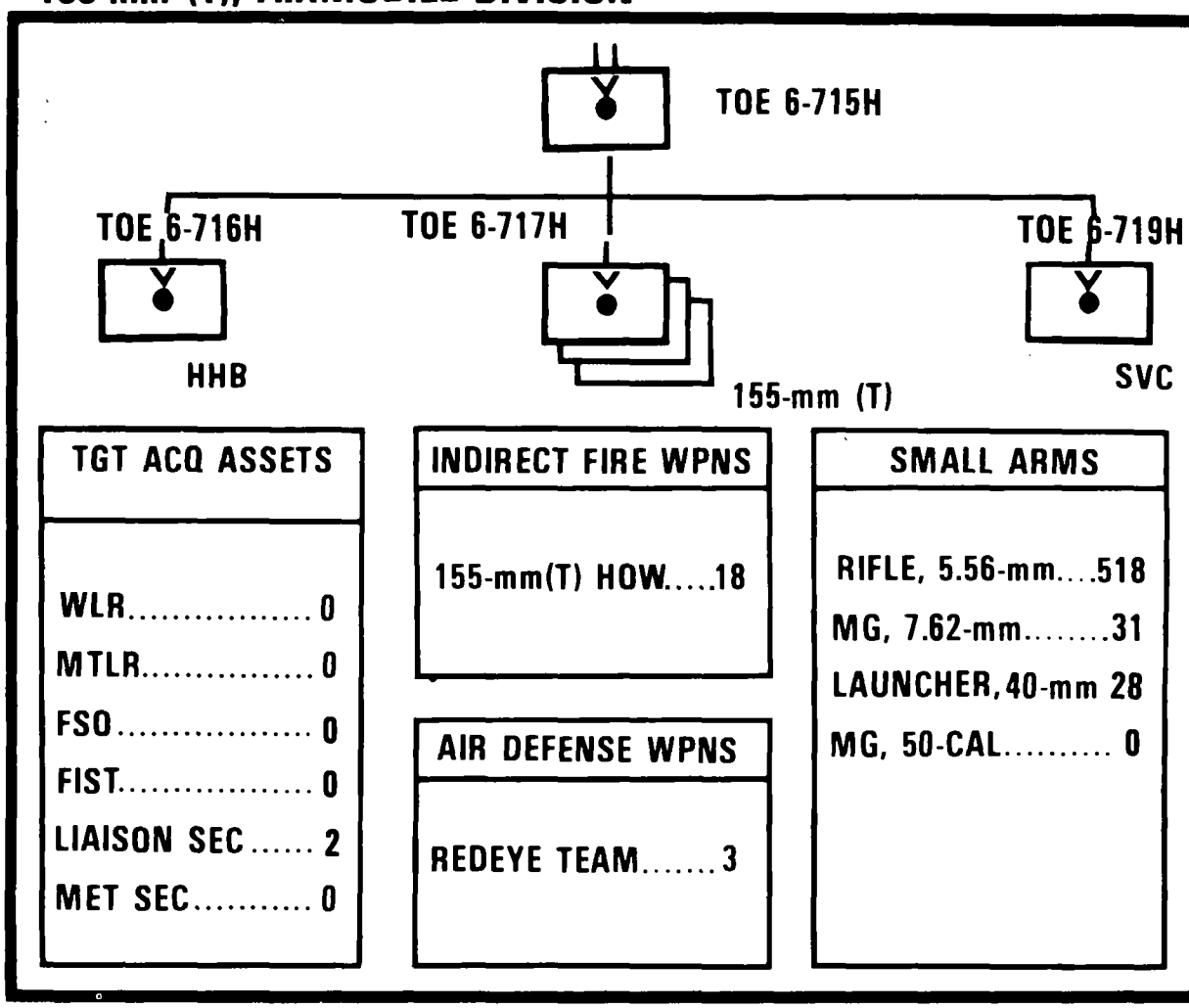


Figure A-7.

is organized, trained, and equipped to provide nonnuclear artillery fires in support of a separate infantry brigade and to augment the fires of other field artillery units.

Because this battalion is usually employed in the direct support role, it is organized essentially the same as the infantry division 105-mm (T) FA battalion. Minor differences in TOE exist because this battalion does not have a parent FA headquarters (division artillery) and is therefore authorized additional personnel/equipment to provide a meteorological and target acquisition capability, which would normally be provided by division artillery for divisional field artillery battalions.

FIELD ARTILLERY BATTALION, 105-mm (T), INFANTRY BRIGADE (SEPARATE)

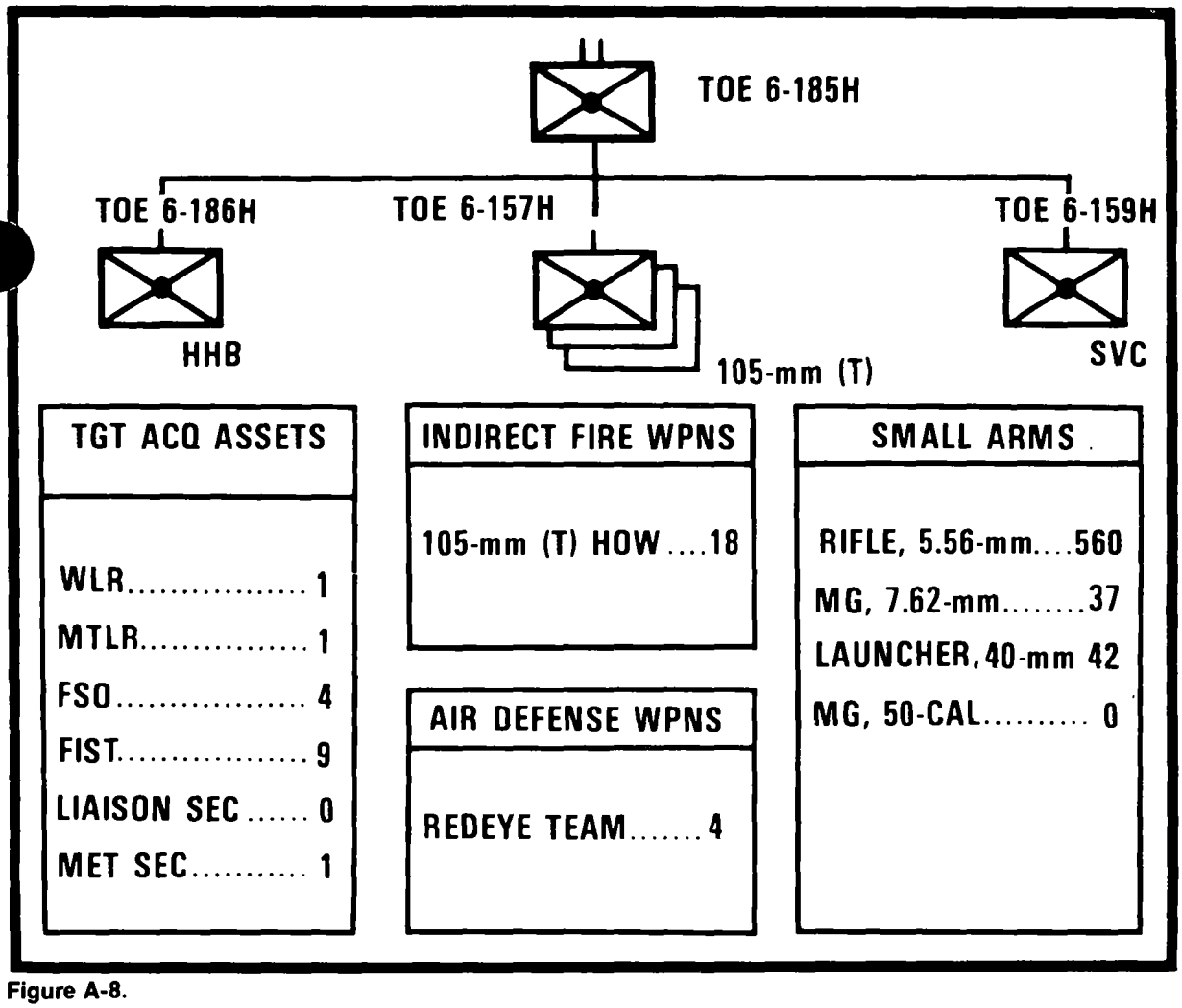


Figure A-8.

Cannon battalion, 105-mm (T), separate light infantry brigade (fig A-9), is organized, trained, and equipped to provide nonnuclear artillery fires in direct support of a separate light infantry brigade and to augment the fires of other field artillery units when required. The battalion has organic fire support sections and FISTs. The difference between this battalion and the infantry division 105-mm (T) battalion is that the headquarters and service element of the battalion are combined into a headquarters, headquarters and service battery. This battalion is also authorized personnel and equipment to provide a meteorological and target acquisition capability.

FIELD ARTILLERY BATTALION, 105-mm (T) LIGHT INFANTRY BRIGADE (SEPARATE)

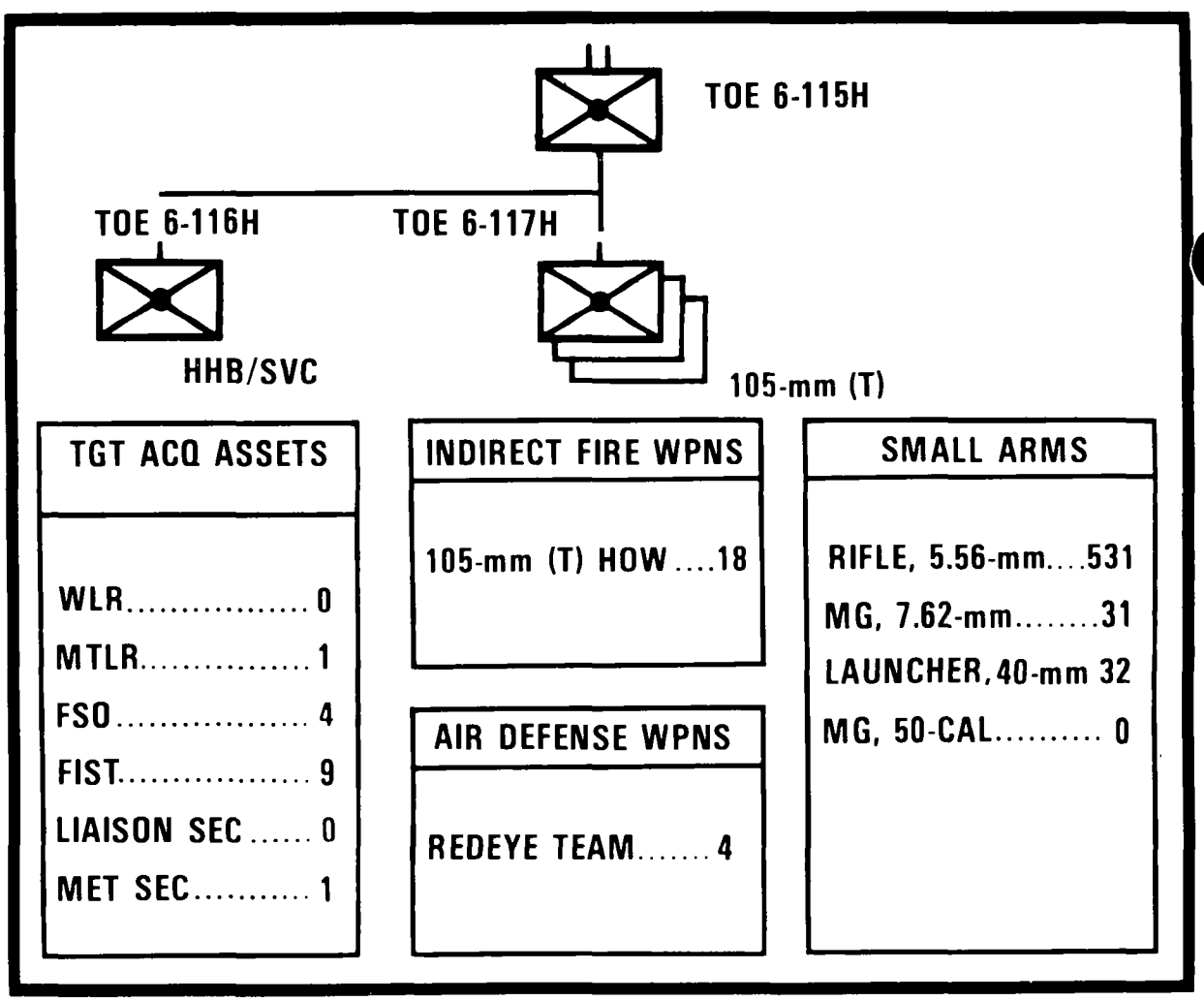


Figure A-9.

Cannon battalion, 155-mm (SP), separate armored brigade (fig A-10), is organized, trained, and equipped to provide direct support fires, to include nuclear fires, to a separate armored brigade and to augment the fires of other field artillery units. This battalion is organized essentially the same as the armored or mechanized 155-mm (SP) battalion. Differences in TOE exist because this battalion does not have a parent headquarters (division artillery) and therefore must have the capability to provide its own target acquisition and meteorology.

FIELD ARTILLERY BATTALION, 155-mm (SP), ARMORED BRIGADE (SEPARATE)

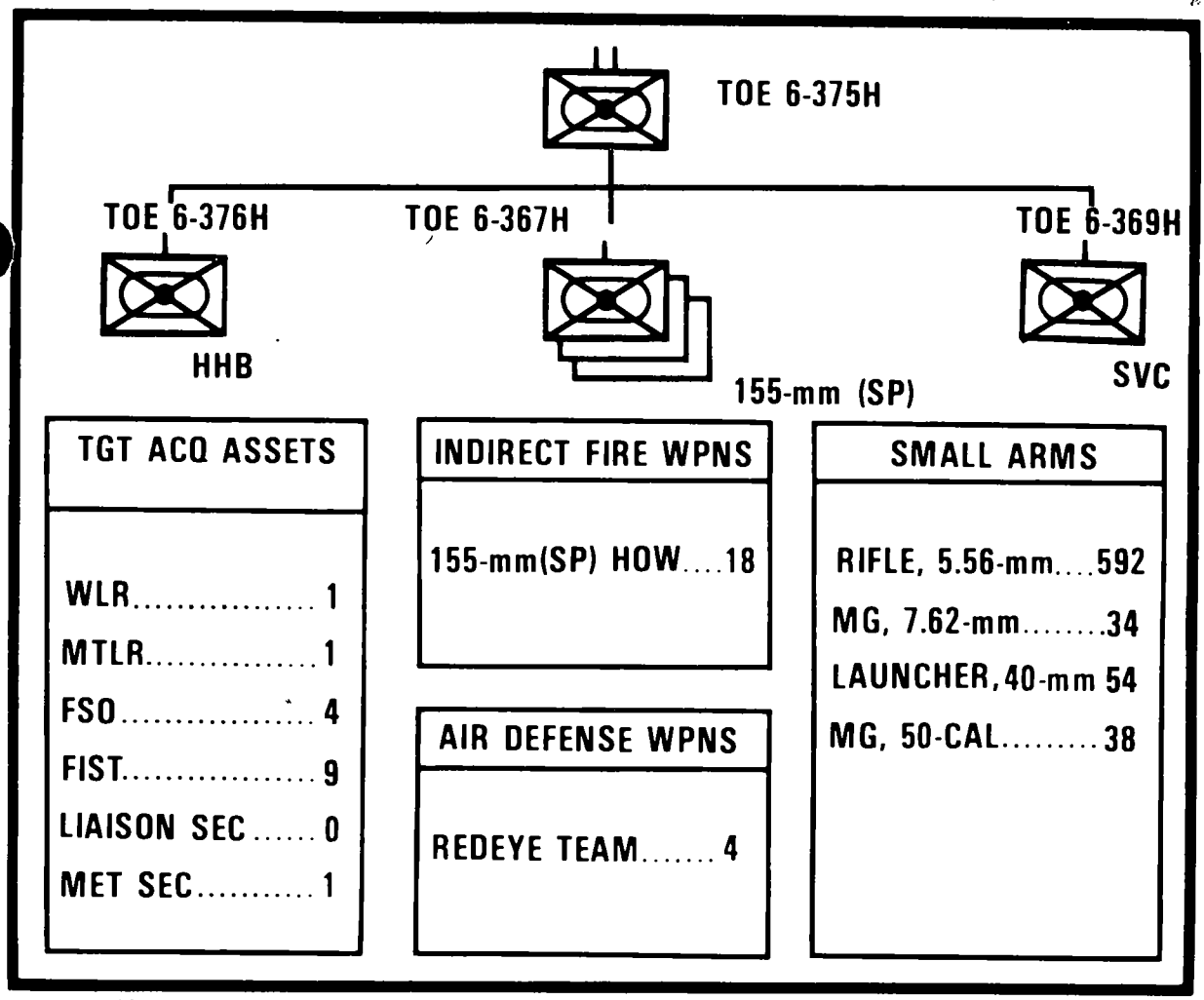


Figure A-10.

Nondivisional cannon battalions.

Nondivisional (corps) 105-mm, 155-mm, and 8-inch cannon battalions are organized similar to those of divisional or separate brigade field artillery battalions except that corps battalions do not have organic fire support sections and FISTs. Corps cannon battalions each have one organic liaison section, providing the capability to establish liaison with other field artillery units when the battalion is employed to reinforce the fires of those units. Figures A-11 through A-14 show the organization of corps 105-mm, 155-mm (T and SP), and 8-inch cannon battalions.

FIELD ARTILLERY BATTALION, 105-mm (T)

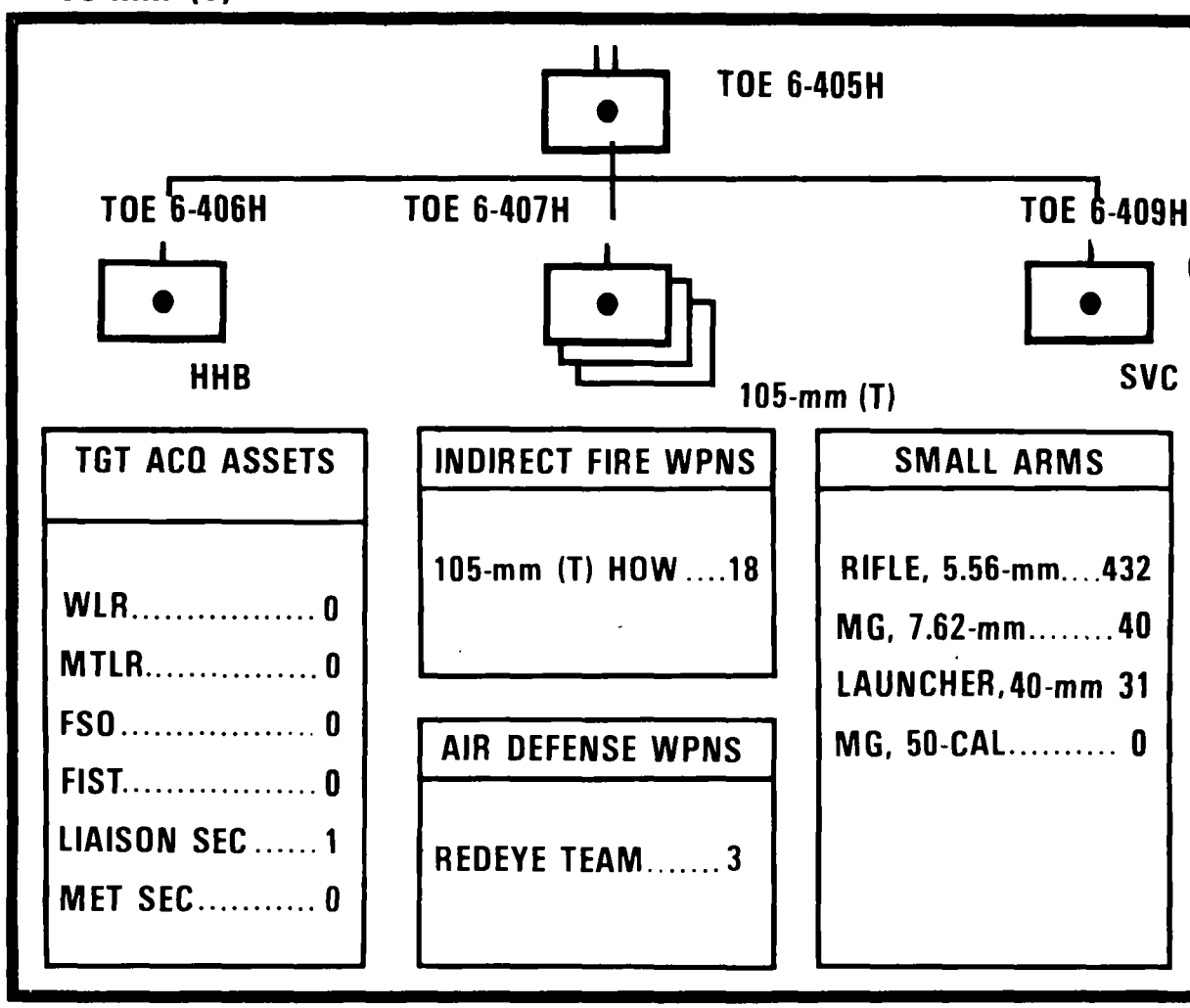


Figure A-11.

These cannon battalions are organized, trained, and equipped to provide fires in general support of a force or to reinforce the fires of other field artillery units (corps FA 155-mm and 8-inch battalions are also capable of delivering nuclear fires). These battalions can be employed in direct support of a maneuver force if augmented with communication equipment.

FIELD ARTILLERY BATTALION, 155-mm (T)

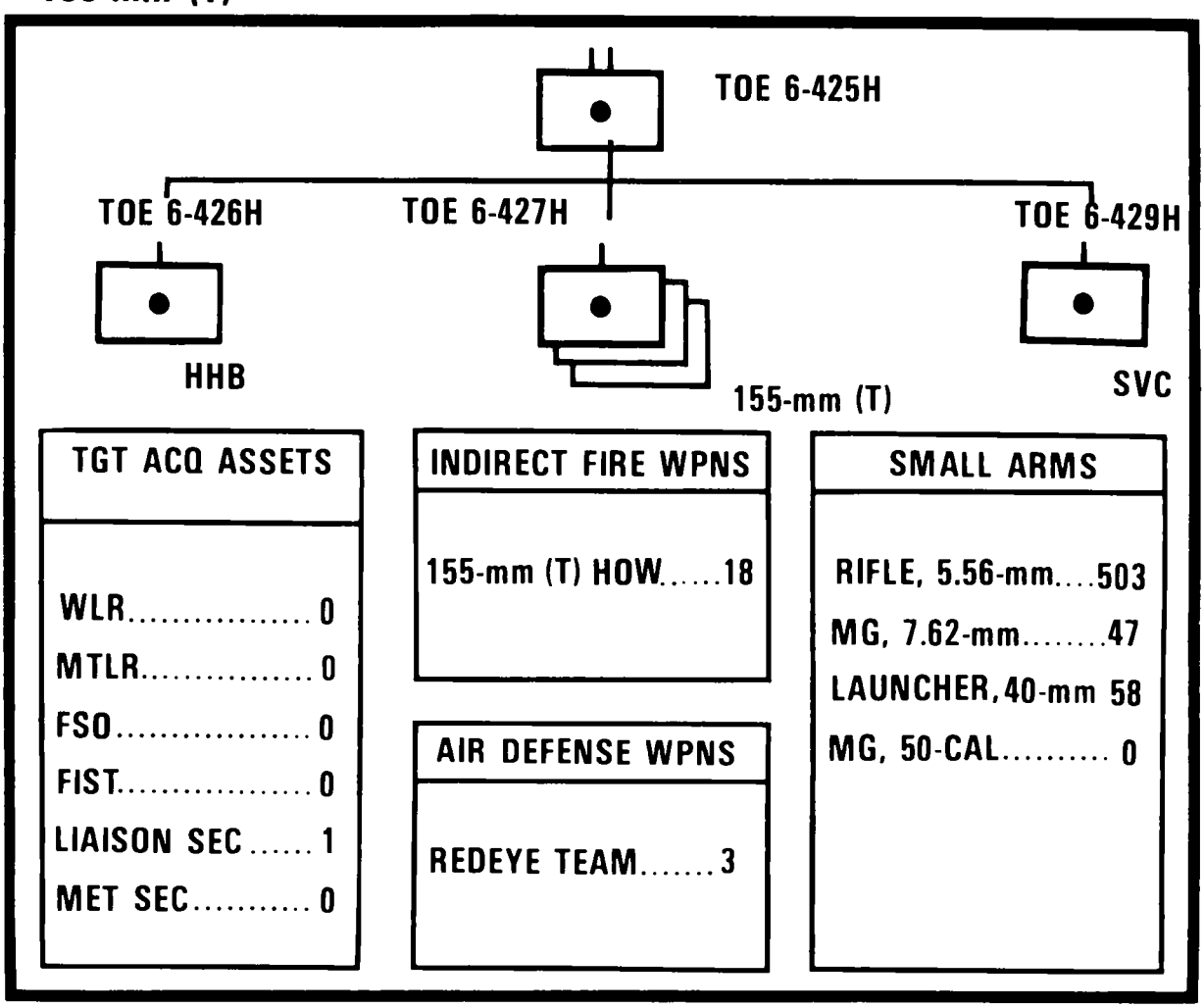
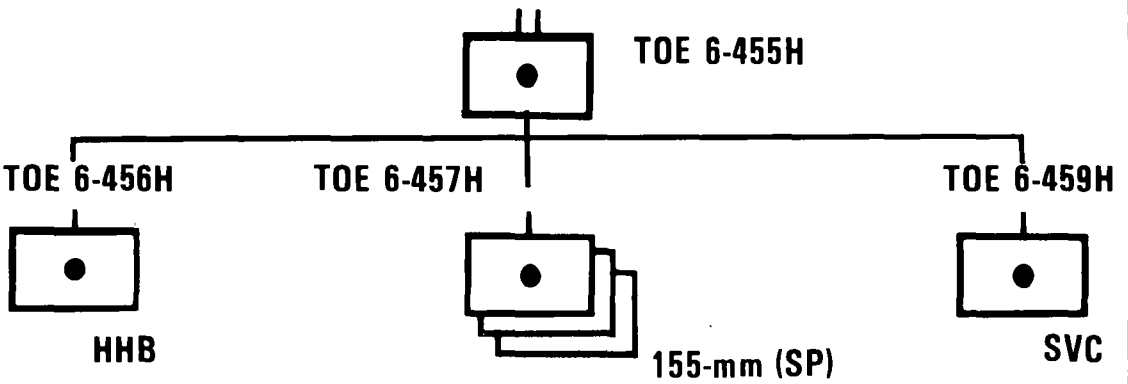


Figure A-12.

FIELD ARTILLERY BATTALION, 155-mm (SP)



TGT ACQ ASSETS	
WLR	0
MTLR	0
FSO	0
FIST	0
LIAISON SEC	1
MET SEC	0

INDIRECT FIRE WPNS
155-mm(SP) HOW....18

AIR DEFENSE WPNS
REDEYE TEAM.....3

SMALL ARMS
RIFLE, 5.56-mm....501
MG, 7.62-mm.....48
LAUNCHER, 40-mm 54
MG, 50-CAL.....38

Figure A-13.

FIELD ARTILLERY BATTALION, 8-INCH (SP)

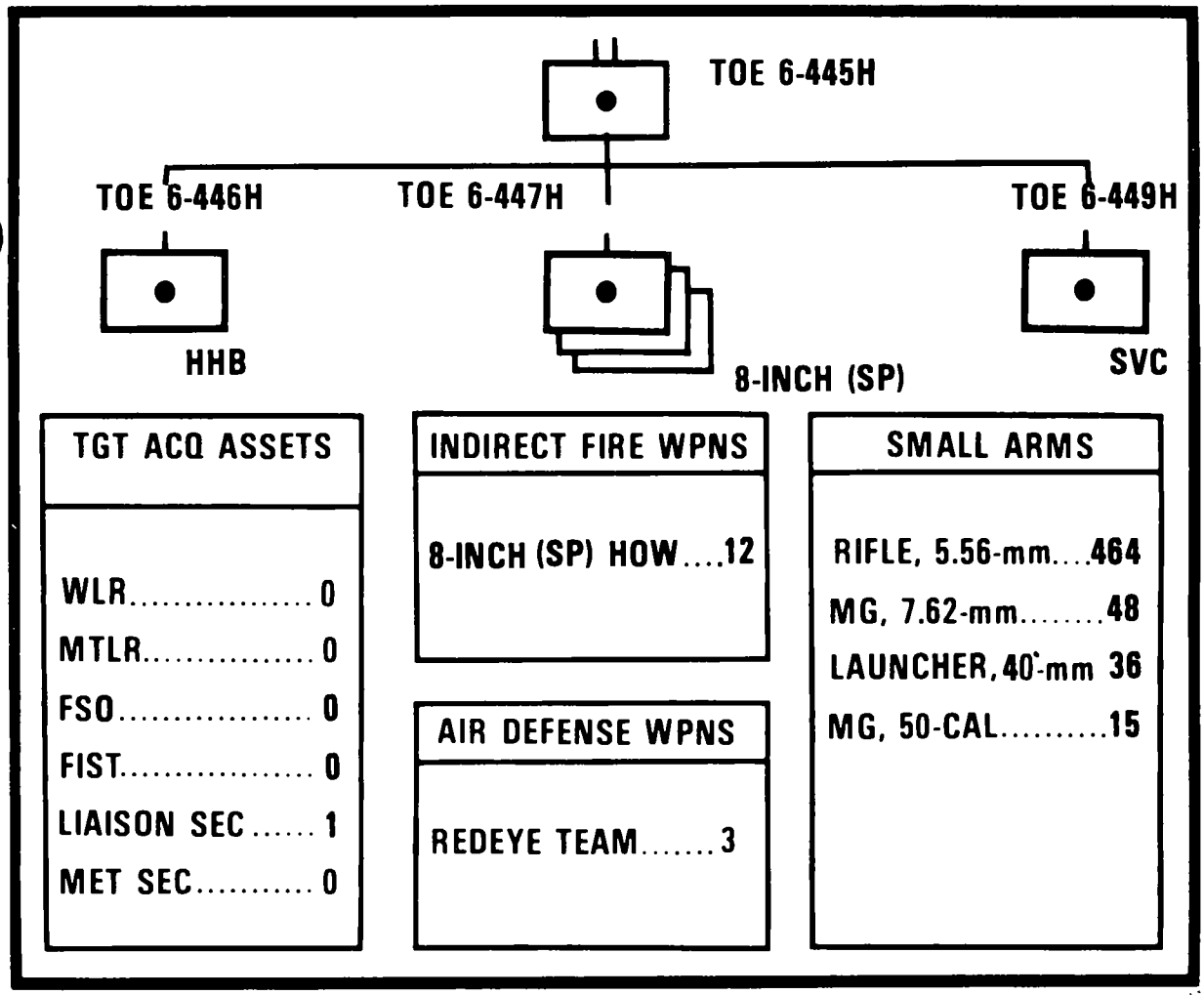


Figure A-14.

Gun battalion, 175-mm (SP) (fig A-15) is unique in that this caliber is not organic to divisions or separate brigades.

The battalion is organized, trained, and equipped to provide general support to a force.

This battalion, like other corps cannon battalions, has no FSO nor FIST capability but does have a liaison section. This section provides the capability to establish liaison with other field artillery units when the battalion is reinforcing the fires of those units.

FIELD ARTILLERY BATTALION, 175-mm (SP)

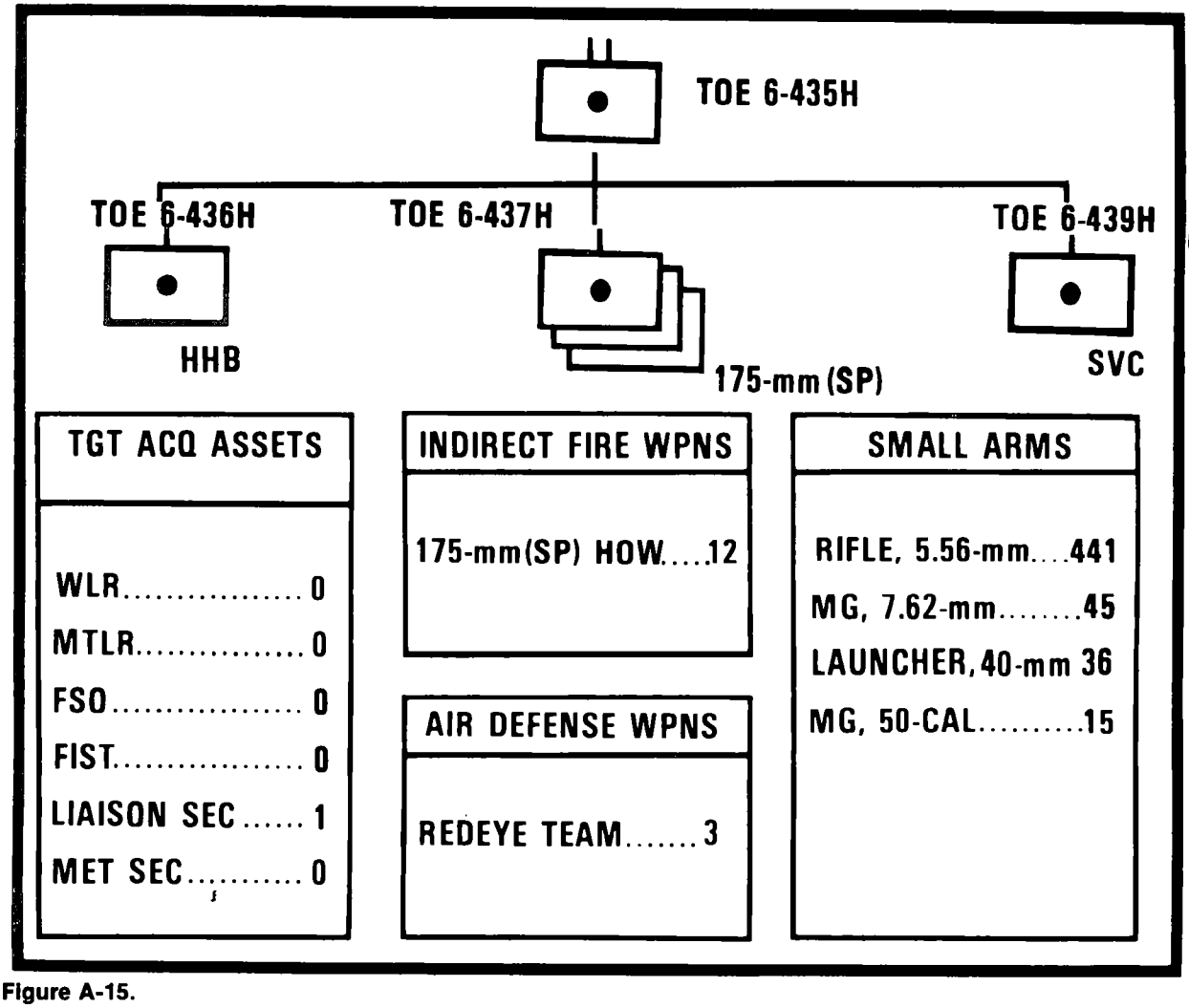


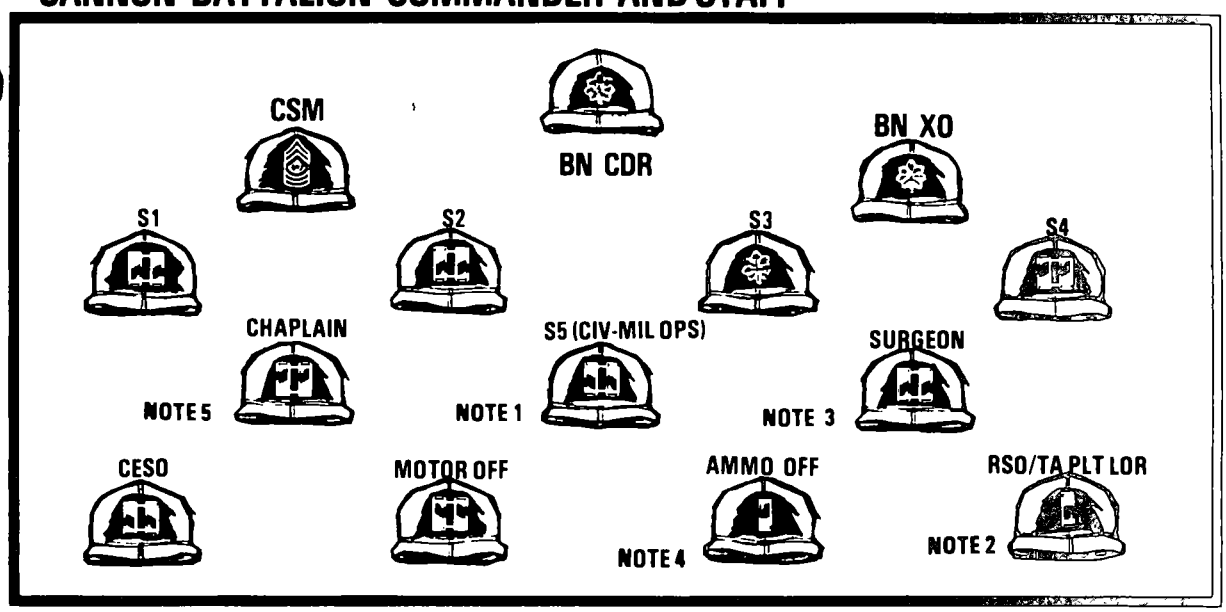
Figure A-15.

APPENDIX B:

Functions Of The Primary Staff

The battalion staff.

CANNON BATTALION COMMANDER AND STAFF



Notes. 1. When authorized by MTOE; otherwise, commander should designate another staff officer to perform this function.

2. Target acquisition platoon is authorized in FA battalions organic to separate brigades.
3. In nondivisional units only. In divisional units a warrant officer (physician's assistant) is provided.
4. Assigned to service battery.
5. In nondivisional units only.

The battalion staff assists the commander to command control and coordinate all battalion activities. The commander organizes his staff as he deems necessary and assigns functions to the staff to accomplish the mission. *Staff officers are not commanders.* Staffs exist to support commanders, so it is necessary for the commander to tell the staff what it is they are to do, at least in general terms. Staffs assist all commanders in the battalion. Staff sections gather information and furnish appraisals and advice to commanders. Staff sections, working in coordination with each other, with battery commanders, and with staffs in other organizations, convert the commander's decisions into plans and orders, which they disseminate to the command.

The command sergeant major. The command sergeant major is the senior enlisted man in the battalion. He has his fingers on the pulse of the command and advises the commander on enlisted matters. He is often the one who first discovers that the commander's decisions and policies are not being carried out in the manner intended. Also, it is often the command sergeant major who recognizes which of the commander's policies are in need of modification or change.

The executive officer. The executive officer's functions and responsibilities are similar to those of a chief of staff. He may be directed to coordinate and supervise staff activities, represent or act for the commander when directed to do so, and—as second in the chain of command— he must be prepared to take command of the battalion at any time. He may also serve as a deputy commander for administration and logistics, overseeing the S1 and S4 and their attendant sections in the performance of their support duties and concentrating on administration, resupply, maintenance, and battalion trains.

Staff functions.

The following pages describe functions of the primary staff that pertain to common tasks of the cannon battalion.

STAFF RELATIONSHIPS

Section I. Personnel

TASK	S1	S4	S2	S3
1. Maintenance of unit strength.				
a. Loss estimating.	Maintains a continuous loss estimate balanced against forecast replacements.		Furnishes anticipated effects of enemy mass destruction weapons.	Considers impact of anticipated losses on courses of action.

TASK	S1	S4	S2	S3
b. Personnel reports and records.	Supervises system of records and reports showing status of personnel matters including strength reports, casualty reports, and personnel requisitions.	Considers personnel strengths in planning requirements for logistics operations.		Considers personnel strengths in formulating plans and determining vulnerabilities.
c. Replacements.	Determines requirements; supervises requisitioning procedures; recommends allocations; establishes policies and procedures for processing; plans for movement.	Recommends priority of assignment to combat service support elements when strength is critical; provides logistic support of replacement system.	Recommends disposition of specially trained intelligence personnel.	Recommends priority of assignments when replacements are critical.
2. Personnel management.	Classifies and assigns personnel.			
Prisoners of war.	Plans for and supervises custody, administration, utilization, and treatment of prisoners of war and civilian internees.	Provides food and emergency clothing; provides transportation and coordinates evacuation.	Estimates the number and capture rate of PWs; designates detention areas; insures screening and initial interrogation of selected PWs.	Considers requirements for troop units as guards for large numbers of PWs; coordinates military police (MP) support.
3. Development and maintenance of morale.	Exercises staff responsibility for postal, finance, religious, exchange, welfare, and legal services, and rest and leave.			
a. Decorations and awards.	Recommends policies for decorations and awards; insures that recommendations for awards are made promptly.	Procures decorations as required.		

TASK	S1	S4	S2	S3
b. Graves registration.	Exercises staff responsibility for planning and supervising graves registration activities.	Coordinates transportation.		
4. Health service.	Develops estimate of injury, sick, and wounded rate for future operations; recommends policy for evacuation and hospitalization of casualties due to fallout contamination and chemical or biological warfare.	Provides additional transportation as required.	Provides S1 with enemy situation and capabilities and characteristics of the area of operations that may affect evacuation or hospitalization plans.	Provides plan of operations and present dispositions for planning for evacuation and hospitalization; requests attachment of medical units and/or facilities when approved by the commander; requests Army aviation for evacuation requirements.
5. Maintenance of discipline, law, and order.	Exercises staff responsibility for matters of discipline, law, and order; arranges for courts-martial within commander's jurisdiction and desires.	Furnishes statistics on trends of loss or damage to equipment due to carelessness.	Monitors matters of discipline, law, and order for impact on security clearances.	Includes corrective measures in training programs as directed.
6. Headquarters management.		Coordinates logistics support, including shelter, repair, construction, and maintenance for the headquarters.	Assists S1 and HQ battery commander in planning for counterintelligence measures for movement, location, and operation of the headquarters.	Coordinates the general location, time, and conditions of movement of the HQ and overall defense of the HQ area with HQ battery commander.

TASK	S1	S4	S2	S3
7. Message center operations.				Coordinates the internal distribution of incoming messages and use of motor messages with the CESO.

Section II. Intelligence

TASK	S2	S3	S4	S1
1. Collection of information.				
a. Reconnaissance.	Originates air reconnaissance requests and disseminates results.	Recommends area for air reconnaissance.		
b. Target acquisition.	Plans target acquisition in coordination with S3; coordinates the actions of organic and attached target acquisition personnel and equipment; exchanges information with intelligence sections of higher, adjacent, and supported units; receives and analyzes shelling reports (SHELREP) and crater analysis reports; provides derived target information to S3.	Informs commander of plans that affect target acquisition activities; evaluates potential targets developed by the S2; assesses target location, surveillance reports, and intelligence from FISTs and FSOs to S2.		

TASK	S2	S3	S4	S1
c. Prediction of fallout for nuclear weapons employed by enemy or friendly forces.	Receives information on location, height of burst (HOB), and yield of enemy-delivered weapons; disseminates this information to staff.	Monitors fallout prediction information and evaluates impact on operations; estimates the effect of predicted fallout on the area of operations.	Estimates the effect predicted fallout will have on logistical support and initiates actions to minimize effect; estimates vulnerability of trains areas to predicted fallout and initiates plans to minimize vulnerability.	Uses fallout as a factor in estimating casualties and replacement requirements.
d. Technical intelligence.	Uses technical intelligence in studies; disseminates technical intelligence.	Receives and requests technical intelligence that may affect operation of battalion.	Evaluates technical intelligence material that affects logistics.	
e. Weather information.	Requests and disseminates weather information; obtains and distributes meteorological messages; prepares meteorological plan when authorized a met section.	Analyzes weather information for effect on operations and training; informs S2 of requirements for meteorological messages.	Analyzes weather information for effect on logistics activities.	Analyzes weather information for effect on health of personnel.
2. Production of intelligence.	Obtains, analyzes, and disseminates information on area of operation; prepares and disseminates intelligence estimates as required; prescribes allowances for maps and map substitutes (in coordination with S3); requests and distributes maps and map substitutes.	Analyzes plans and area of operation to determine map coverage required.		Passes any intelligence received from handling PWs to S2.

TASK	S2	S3	S4	S1
3. Development of essential elements of information.	Collects and recommends to the commander essential elements of information (EEI) for inclusion in battalion intelligence collection plan; disseminates approved EEI to staff and subordinate units.	Recommends EEI pertaining to potential targets.		
4. OPSEC.	Provides information as to what the enemy's intelligence collection capabilities are in the battalion area of operation; supervises personnel and document physical security.	Designates areas and activities requiring OPSEC countermeasures; plans and supervises implementation of OPSEC countermeasures.		
5. Intelligence training.	Prepares intelligence training programs; establishes requirements for intelligence training material; coordinates EW training with CESO.	Implements intelligence training, including electronic security and electronic counter-countermeasures (ECCM).		

Section III. Operations

TASK	S3	S2	S4	S1
1. General operations.	Advises commander on organization and training; maintains information on friendly tactical situation.	Provides commander and staff with current intelligence situation; supervises intelligence and counterintelligence activities.	Advises commander/S3 on ability to support operation.	Advises commander/S3 on ability to support operation.

TASK	S3	S2	S4	S1
2. Training.	Prepares and supervises execution of training programs; supervises the planning and conduct of field exercises; determines requirements for, procures, and distributes or assigns training aids and facilities; plans, conducts, and coordinates training evaluation; establishes requirements for and specifies training for battalion and battery teams; if assigned FSOs and FISTs, prepares and supervises their training.	Supervises and evaluates intelligence training; provides S3 with training recommendations.	Recommends, supervises, and evaluates logistical training, particularly maintenance training.	Recommends, supervises, and evaluates administrative, personnel, Uniform Code of Military Justice (UCMJ), and medical training.
3. Operations.				
a. Operations estimate.	Based on the commander's planning guidance and on information from other staff officers, prepares operations estimate, which culminates in a recommended course of action.	Provides S3 with intelligence estimate and analysis of area of operations.	Informs S3 of capability to support mission and personnel limitations and may recommend course of action from personnel viewpoint.	Informs S3 of capability to support mission, of logistics limitations, and may recommend course of action from logistics viewpoint.

TASK	S3	S2	S4	S1
b. Tactical plans.	Conducts tactical planning to include supervision and coordination of supporting plans; prepares alternate operation plans as required; recommends allocation and priorities for personnel, supplies (including RSR), equipment, and positions. When battalion is assigned DS mission, develops the FA support plan; keeps other staff officers informed of plans that affect their areas; incorporates electronic security and ECCM into plans; establishes NCS for each battalion net; establishes priorities for air defense of battalion elements; recommends immediate action status of batteries for various phases of the plan; coordinates battalion and battery defense plans; establishes policy on attack of targets.	Provides S3 with continuing intelligence and recommends revisions to the plan as intelligence information changes; recommends signal security policy; coordinates enemy EW threat with CESO and S3; plans for processing and evaluation of PWs, captured documents, and equipment.	Advises S3 of logistical limitations that may affect the tactical plan and prepares plans for supply, particularly of ammunition.	Advises S3 of personnel limitations that may affect the tactical plan.

TASK	S3	S2	S4	S1
c. Tactical movements.	In coordination with S4, plans, coordinates, and supervises displacements; in coordination with CESO and headquarters commandant, selects general location of the battalion CP; conducts reconnaissance.	Advises S3 concerning counterintelligence aspects of movements; provides information on weather, terrain, and enemy situation.	Receives transportation requirements from S3 and allocates transportation assets; determines priority for movement of service battery elements; supervises traffic control.	Supervises movement, internal organization, security, and allocation of shelter for headquarters troops and staffs.
d. Execution.	Supervises and coordinates actions of operations section (including FDC), other staff sections, and batteries; maintains and provides information on location and status of batteries; informs S4 of ammunition requirements; supervises preparation of operational records and reports; prepares orders for the commander's approval; processes and coordinates nuclear fire missions; through FDOs, supervises battalion FDC and monitors actions of battery FDCs; coordinates defense of the battalion against ground, air, and artillery attack.	Provides targeting information to S3; prepares target acquisition capabilities information; maintains situation map; receives or prepares and disseminates intelligence reports; directs battalion counterfire intelligence activities including coordinating radar operations, shell reporting, and crater analysis; processes PWs, captured documents, and material to obtain immediate intelligence information.	With assistance of ammunition officer, supervises resupply of ammunition; informs S3 of ammunition and supply status of battalion; supervises supply functions to insure adequate procurement and proper distribution.	Maintains records on and reports battalion strength; reports casualties and requests replacements; processes and assigns replacements in coordination with S3.

Section IV. Logistics

TASK	S4	S3	S2	S1
1. Supply.	Determines supply requirements; procures supplies by requisition on the supply base of support; insures proper receipt, storage, and distribution of supplies; determines method of distribution; insures distribution schedules are effective; insures availability of transportation for distribution; selects supply routes.	Recommends allocation and priorities for equipment and supplies having an impact on training or tactical mission; recommends prescribed loads for equipment and supplies pertaining to training tactical mission.	Provides S4 with information on enemy capabilities for interfering with logistic support and on characteristics of area of operations that may affect logistic support; provides supply requirements for prisoners and projects future requirements based on estimated capture rates.	Provides unit strengths and loss estimates to S4 as a basis for logistic support forecast; provides S4 with an estimate of number of replacements for determination of equipment and supply.
2. Transportation.	Determines transportation requirements; coordinates required transportation from assigned and attached transportation assets or from those received from superior headquarters; consults with S3 to determine allocations and priorities; responsible for administrative movements to include selection of routes (in coordination with S3), highway regulation, and traffic control.	Provides S4 with requirements for transportation for training or tactical purposes; coordinates use of routes with S4; may recommend use of routes be restricted for tactical use only.	Provides information on the area of operations as it affects the use of transportation; keeps S4 informed of enemy capabilities that may interrupt routes.	Provides S4 with requirements on transport of replacements and PWs; coordinates with S3 for use of military police for traffic control and discipline, law, and order enforcement.

TASK	S4	S3	S2	S1
3. Services.				
a. Priorities for employment.	Prepares general plan for service support to include selection and allocation of combat service support assets (in coordination with the operations officer), plans for recovery and evacuation of vehicles and equipment, collection and disposition of excess property; recommends evacuation and repair policies; recommends amount and type of maintenance training; provides commander and staff with evaluation of maintenance conditions, estimate of impact on planned operations, and recommendations for correction or improvement of conditions.	Provides S4 with requirements for combat service support; may recommend priority of maintenance effort.		Submits to the S4 requirements for combat service support.
b. Movement and general location for combat service support activities.	Selects general location of support area; designates time of movement of service units; coordinates with supporting activities.		Provides S4 with enemy situation and capabilities affecting location of logistic activities and time of movement.	Coordinates with S4 on general location and time of movement as concerns administrative activities.

TASK	S4	S3	S2	S1
c. Maintenance.	Supervises maintenance program; coordinates backup support for maintenance beyond the capability of assigned or attached maintenance assets.	Coordinates with S4 for inclusion of maintenance training and supply economy in training program; CESO coordinates COMSEC evacuation and communications-electronics (CE) organizational maintenance and external support requirements.		
d. Utilities for facilities.	Coordinates activities pertaining to maintenance and repair of utilities for facilities.			
e. Collection and disposition of excess property, salvage, and captured materiel.	Provides subordinate units with guidance for disposition of excess property, salvage, and captured materiel; allocates usable supplies and equipment (coordinates with S3).	May recommend use, allocation, and priority of issue of excess property.	Collection and disposition of captured enemy materiel are the primary staff responsibilities of the S4 but coordination with S2 and technical intelligence personnel is required.	

APPENDIX C:

Communications

To provide firepower at the right place and time, the cannon battalion must be able to communicate. Observers and fire support team chiefs must be able to transmit calls for fire and provide subsequent corrections without delay or interruption; fire support officers must be able to coordinate the attack of targets rapidly; and fire direction centers must be able to send fire commands to firing sections.

To establish a responsive and dependable communication system, the cannon battalion communication system must overcome several limitations.

The battalion has a limited number of FM radios to support requirements such as a split operations FDC element.

The battalion must be able to monitor multiple radiofrequencies concurrently while maintaining continuity of operation during displacement.

The battalion must be capable of communicating over long distances to many diverse elements, such as FISTs, FSOs, reinforcing units, and higher headquarters.

The battalion must be prepared to place nearly total reliance on radio communications, as the speed of battle may reduce severely the efficient use of wire and messengers.

The battalion must be prepared to operate in an environment where the enemy will expend numerous resources to destroy 50 percent of the battalion's radio communication capability.

Communications-electronics responsibilities.

Senior to subordinate. Each commander is responsible for establishing communications with subordinate units.

Supporting to supported. A supporting unit is responsible for establishing communications with supported units.

Reinforcing to reinforced. A reinforcing unit is responsible for establishing communications with reinforced units.

Lateral communications. Responsibility for establishing communications between adjacent units may be fixed by the next higher commander or standing operating procedure. If responsibility is not fixed by orders or SOP, the commander of the unit on the left is responsible for establishing communications with the unit on the right.

Restoration. All units must take prompt action to restore lost communications.

Communications-electronics staff officer.

The CESO works under the staff supervision of the battalion S3 or executive officer. The CESO may also command the headquarters battery communications platoon. The communications officer supervises all communication activities, to include installation, operation, and maintenance of communication systems and equipment necessary to support combat operations. He is also responsible for the preparation of the battalion communications-electronics operation instructions and safeguarding of communications security material. Principal duties of the CESO during tactical operations are listed in figure C-1.

CESO RESPONSIBILITIES DURING TACTICAL OPERATIONS.

TASK	CESO ACTIONS
1. Counterintelligence	Advises commander and staff on ECCM and security of electronic emitters. Conducts signal security monitoring to determine vulnerabilities and insure personnel are employing authorized codes.
2. Training	Recommends, supervises, and evaluates communication training.
3. Tactical plans	Plans battalion communication system to support tactical and displacement plans.
4. Tactical movements	Recommends general location of CP from communication standpoint.
5. Execution	Directs the installation, operation, and maintenance of battalion communication system.

Figure C-1.

Battalion communications platoon.

There is a communications platoon in each headquarters battery. It is organized with a platoon headquarters, a wire section, and a radio section. The communications platoon installs, operates, and maintains the communication system for the cannon battalion command control and trains elements.

The platoon performs organizational maintenance on battalion headquarters and headquarters battery communication equipment. It also provides organizational maintenance for the subordinate units of the battalion. All elements of the battalion evacuate equipment for repair through the communications platoon.

The platoon installs and operates the battalion wire system. This system includes lines within the headquarters and trains area for the commander, staff, and elements of the headquarters and headquarters battery and lines to subordinate batteries and attached units when time and conditions permit. Priorities for installation of lines are normally established by SOP or as directed by the battalion commander or S3. The platoon operates AM radioteletypewriter equipment in the division artillery brigade RATT net(s).

The exact composition of the platoon headquarters varies with each type of battalion. Two key personnel are the platoon leader and battalion communications chief. Their duties and responsibilities are outlined in FM 11-50, *Combat Communications Within the Division.*

The battalion telecommunications center.

The battalion telecommunications center is the communication agency that receives, transmits, and delivers messages for the commander and the staff. Telecommunications center procedures should insure accuracy, speed, and security. Procedures that will meet the needs of the unit and conform to the specific requirements established by higher headquarters should be included in the unit SOP. The battalion TOE provides the minimum number of personnel required to operate the center under field conditions. During sustained operations, additional personnel may be required to assist in operating the telecommunications center and perform as unit messengers. Detailed information on tactical telecommunications center procedures is in FM 24-17, *Tactical Telecommunications Center Operation.*

The battalion communication system.

Within the cannon battalion, the means of communication available are radio, wire, visual signals, sound signals, and messengers. The battalion TOE and the commander's policies establish the personnel and equipment available in the battalion for each of these means. Each means of communication has certain capabilities and limitations. The reliability of the communication systems can be enhanced by the use of all means. Communication means are discussed in FM 24-17 and in FM 24-1, *Combat Communications.*

Radio. Radio communication, both FM and AM, is subject to interference such as static, undesired reception from other radios (mutual interference), and deliberate interference (jamming). To avoid detection by enemy direction-finding equipment, the battalion must use all other means to communicate until it is absolutely necessary to use radio. The advantages of radio are that communication can be quickly established, and it can be employed while moving.

FM radio. FM radio is restricted by intervening obstacles as well as by electronic line of sight. However, these restrictions can be overcome by use of carefully selected retransmission sites or aircraft retransmission facilities. FM radios are used by the battalion commander, battalion FDC, fire support personnel, organic batteries, and other authorized users for command control and for fire missions. FM radio users requiring secure communication are provided secure equipment, TSEC/KY-38s, with their FM radios.

AM radio. AM radios have longer planning ranges than FM radios but have more complicated tuning and operating procedures and are sensitive to atmospheric interference. In cannon battalions, AM radios are used primarily in the operation of radioteletypewriters. Voice communication is not currently securable with AM radio, but radioteletypewriter messages are transmitted in the secure mode.

Wire. Wire offers a very dependable means of communication. Wire requires more time, men, and equipment to install and maintain than radio, but it affords person-to-person conversation, teletypewriter communication, and less vulnerability to EW. To reduce radio traffic and to increase survivability, units should install wire at every reasonable opportunity.

Sound and visual communications. These signals may be used to send prearranged messages over short distances and to pass information quickly to a large number of persons. Their proper use requires extensive training because such signals are easily misunderstood. Also, their use may be restricted by poor visibility, combat noise, or security requirements. Authorized signals are found in the unit CEOI. Sound and visual communications may be included in the division CEOI extract and should be used at every opportunity. Signals not included in the CEOI may be established for use within the cannon battalion provided they are understood by all and are changed frequently to avoid compromise.

Sound communications include vehicle horns, whistles, and voice. Sound communications may range from simple SOP, such as three beeps from a vehicle horn to warn of hostile aircraft, to prearranged recognition signals, such as thumping two steel helmets together in periods of limited visibility.

Visual communications include pyrotechnics such as flares and smoke grenades, flags, hand and arm signals, and light signals. Visual signals may be SOP or prearranged and can be as simple

as signals for parking a vehicle to sending extended messages by Morse code or some other code using a flashlight or vehicle headlights (white light or IR).

When white light or IR is used, care must be taken to conceal the light from enemy observation.

Messengers. Messenger communication is a very secure means of communication, and it is flexible and reliable. However, it is slower than other means, may be limited by weather and terrain, and does not afford person-to-person conversation. It is effective for delivering long messages over short distances and for transporting large maps and documents. Speed depends on the messenger's mode of travel, which may be foot, vehicle, or aircraft.

Note. Ground surveillance radar can also be used for communication. A patrol, for example, might report its location by waving a reflector in a prearranged sequence to a monitoring ground surveillance radar (GSR).

Communications operations.

When the scheme of maneuver has been developed, the CESO makes a map reconnaissance and, if possible, a visual reconnaissance to determine any special communication requirements, wire routes when wire is to be used, and a suitable location for the battalion TOC.

When radio is used, transmission must be kept short. Secure means or operational and numerical codes should be used. Low-power transmission, directional antennas, and use of terrain to mask signals from enemy DF equipment will minimize risk of detection. Messengers and wire, if available, should be used for lengthy transmissions.

Direct support battalions. The DS battalion requires five internal FM nets: command fire (CF) direction 1 (CF1), command fire direction 2 (CF2), and three fire direction nets (F1, F2, and F3). There is an additional requirement for an assigned retransmission frequency that is compatible with internal net frequencies. The battalion also operates on two external FM nets, the division artillery command/intelligence net and the division artillery fire direction net.

The battalion CF2 net provides a means of reducing traffic on the battalion CF1 net and acts as an emergency or overflow net. It is used with the CF1 net, not as a substitute net. The CF1 net is the primary net of the battalion. All battalion stations open and operate in this net at the beginning of each new call sign and frequency period, unless otherwise directed by the battalion commander.

The fire nets are monitored by appropriate FDCs and FSOs but are used only when there is a need to transmit time-sensitive traffic. They are the most critical nets of the battalion. Because of the restricted communication capability of the FIST, its assigned fire net is the primary link for providing responsive field artillery support to maneuver units. These nets must be protected not only

from early exposure to enemy EW activities but also from net overload that will reduce communication responsiveness. Figure C-2 shows a method of sequencing the use of nets to meet changing conditions.

The battalion retransmission station (communications platoon AN/VRC-49) must be positioned to provide continuous service to all subordinate stations. Fire support teams, fire support officers, mobile command and staff sections, and even the firing batteries may outdistance their communications capability. The retransmission station acts as a quick and responsive means to reestablish FM radio communications. The station is sited on terrain that will provide optimum communications between battalion and battery FDCs, FSOs, and FISTs. It normally monitors the assigned retransmission frequency and the CF frequency. The station operates in the manual retransmission mode and switches to the automatic mode only when such service is requested or

FM RADIO NET SEQUENCING.

Condition	CF1	CF2	F1, F2, F3
Low density traffic No jamming	All FISTs and battalion stations (except those monitoring corps artillery survey channel and air defense net) initially operate in this net.	Monitored at battalion FDC only.	Battery FDCs, battalion FDC, and battalion FSOs (monitor only).
Medium density traffic Ineffective jamming	Battalion FDC opens CF and directs those stations not involved in operationally urgent traffic on the CF net to enter the CF2 net (e.g., service battery, target acquisition and survey elements, and air defense (AD) elements).		Individual FISTs or FDCs expose appropriate fire nets as required by actual traffic demand. If FISTs use CF2 or retrans for FDC entry, they must return to CF or assigned fire net (if opened) after use, unless otherwise directed by the battalion FDC.
High density traffic Moderate to heavy jamming	Limited to urgent operational traffic	Battalion FDC (NCS) places noncritical stations on listening silence. This allows the CF2 to be a more credible overflow channel for operationally urgent traffic.	

Figure C-2.

directed. Customers who require retransmission call on the retransmission frequency and are handled on an individual basis with priority to FIST stations. Normally, the retransmission station will provide service on the CF net; in the event of a fire mission, it will retransmit to the battalion or battery FDC on any compatible frequency assigned to the battalion. A compatible frequency should have a minimum separation of 10 megahertz from the retransmission frequency and be checked against the interfering frequency chart in the VRC-12 series radio TM.

In addition to the division artillery fire direction net (FM) and the division artillery command/intelligence net (FM), the DS artillery battalion operates in a minimum of one AM/RATT division artillery command fire direction net (usually division artillery CF1). If the battalion has a nuclear capability, a second AM capability may be authorized for use in the division artillery CF2 AM/RATT net. This net is used for all nuclear fire planning and the coordination of operations of nondivision artillery operating in support of the division (fig C-3).

NORMAL RADIO CONFIGURATION–DIRECT SUPPORT BATTALION (ARMORED, INFANTRY, MECHANIZED (AIM) DIVISION).

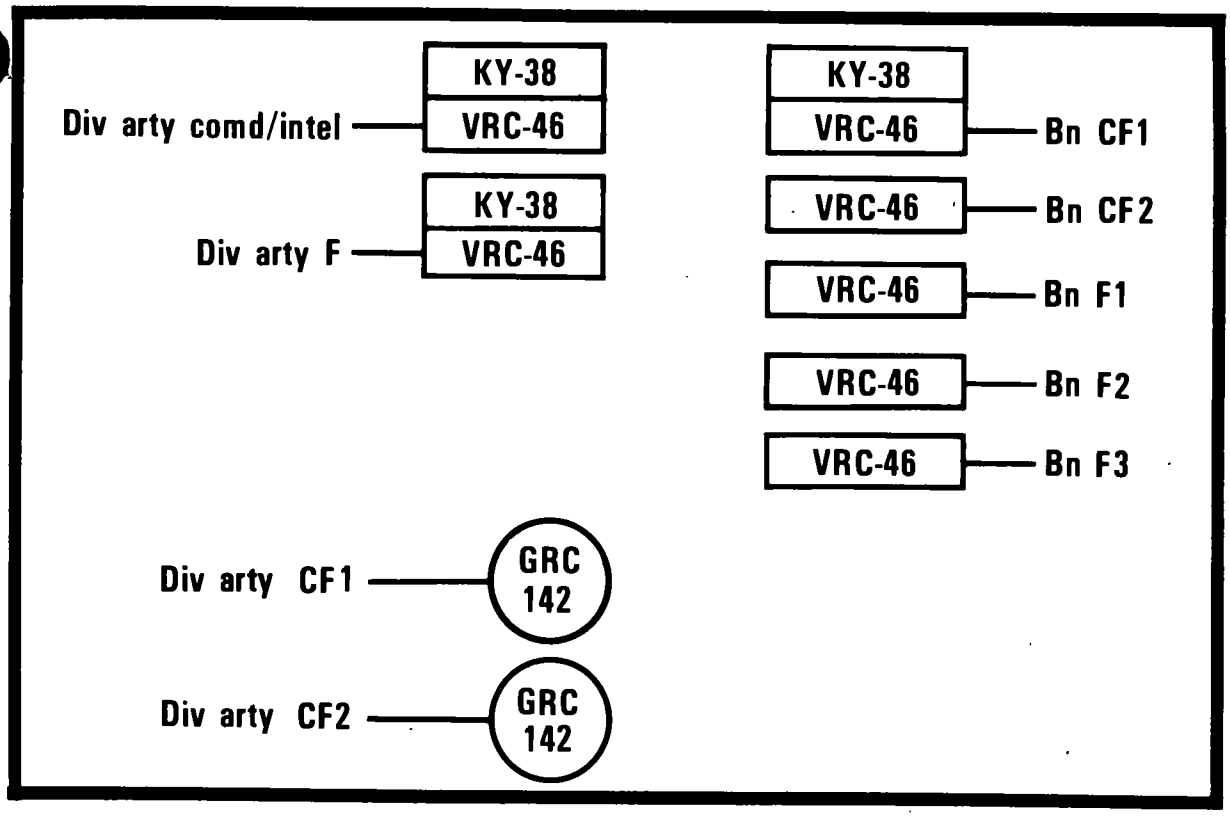


Figure C-3.

Whenever time and resources permit, the battalion should install a complete wire system to improve communication reliability and reduce use of radio. Realistically, however, battlefield dynamics frequently prevent installation of an entire wire system. The normal wire priorities for the four wire teams are circuits to the supported brigade, organic batteries, and the reinforced field artillery unit. The method of installation from battalion to subordinate cannon batteries must be flexible. Depending on relative locations of the battalion and cannon battery CPs, the use of a central wirehead may reduce installation time. The battalion wire team can install and maintain such a wirehead on a continuous basis. Use of a battalion wirehead (fig C-4) allows maximum flexibility in supporting organic cannon batteries. Movement of batteries to new locations may be supported by extending wire from the wirehead or old battery position, as appropriate. The wire team should operate primarily from the wirehead for quick response. Administrative lines from battalion to batteries will be installed as second priority when resources and the tactical situation permit.

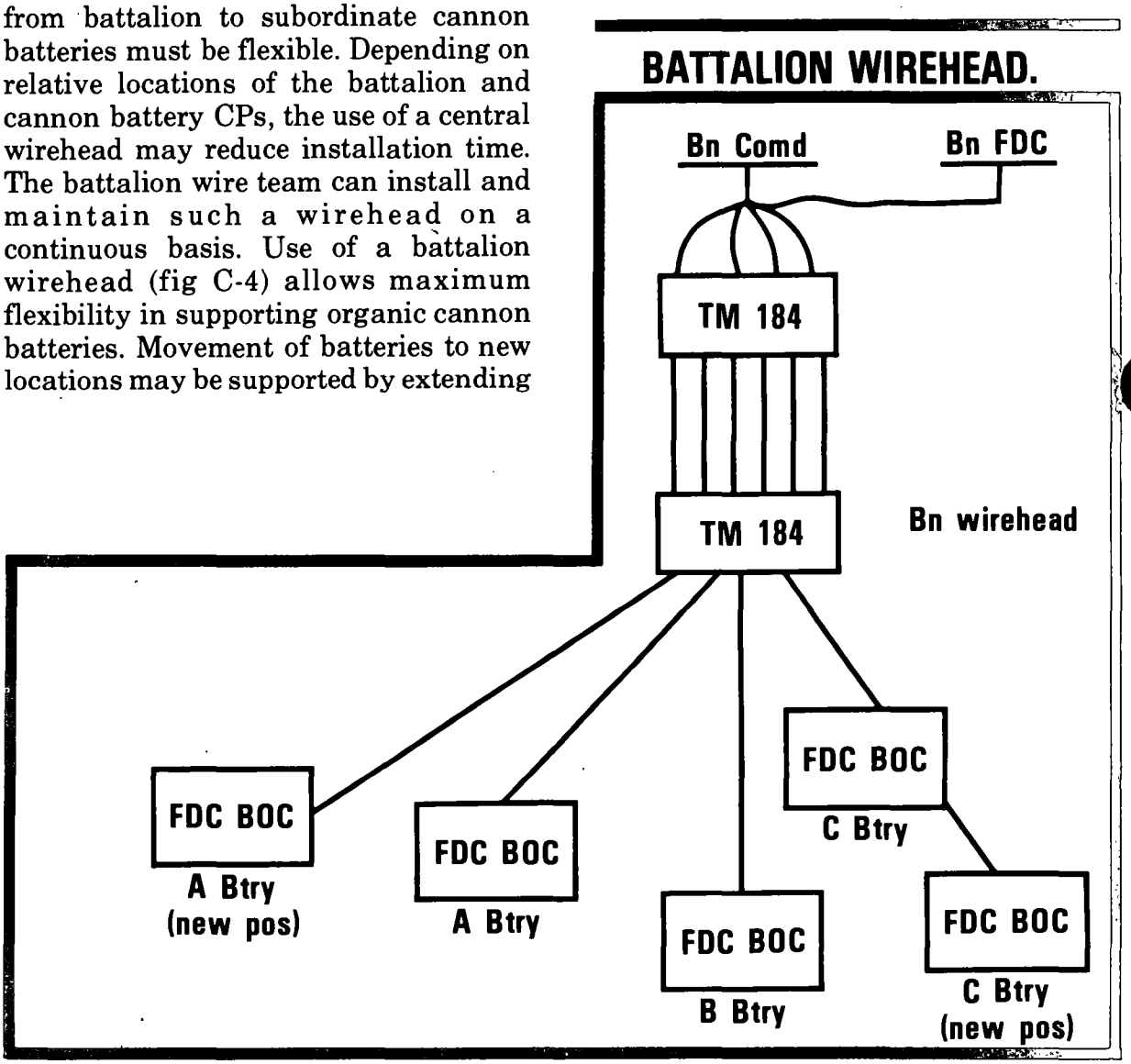


Figure C-4.

Wire circuits to subordinate batteries provide a means of reducing the traffic load on FM radio nets, and the wire circuits to the supported force can serve several purposes. Required communication circuits with the brigade CP and the brigade FSO can be established through these wire circuits. An additional benefit is circuit access into the division multichannel system, which provides the FDC with a link through division multichannel to the division artillery TOC. The DS battalion normally attempts to maintain four wire lines to the supported force but can have satisfactory alternative communications even if only two are successfully maintained.

PRIORITIES FOR WIRE LINES

- **Priority 1.** To the supported force switchboard (providing switched telephone service to the force FSO, the division artillery TOC, or adjacent DS battalion similarly interfaced).
- **Priority 2.** To the supported force multichannel terminal (to interface with prerouted, strap-through circuits from the division artillery TOC, thus establishing the DS battalion FDC to division artillery TOC wire line).
- **Priority 3.** To the supported force FSO (establishing a direct link from the DS battalion FDC to the brigade FSO).
- **Priority 4.** An additional line to the supported force switchboard (to improve switched telephone service for the DS battalion).

Multichannel systems are used to provide communications for combat operations and to tie units into the area communications system. Multichannel links make use of multiplexing—a system of transmitting multiple voice and teletype circuits over one transmission path at the same time. The transmission path can be either radio or cable. Multichannel reduces wire and cable use, can be extended over great ranges, and can be secured.

Split FDC operation—DS. To insure critical radio net continuity during displacement, the commander must establish priorities for coverage of the nets lost by displacing vehicles and radios. The commander identifies critical stations and directs which assets will be used to reconstitute those stations when they are lost.

At the battalion level, the net control station radios of the battalion operations FDC are the most critical. If radios are redistributed to configure for a split FDC operation, the operations FDC should have the highest priority.

Radios used to replace lost radios, or to configure for a split FDC operation, will be radios that are usually deployed in or near the battalion headquarters or service areas. Radios that can temporarily provide required net coverage in the operations FDC are those that belong to the S3, battalion executive officer, HHB commander, service battery commander, battalion maintenance, and the battalion commander. For a short-term basis, radios can be remoted into the operations FDC. During displacement, CP radio resources are configured to insure continuity of essential communications. Jump or forward battalion FDC elements must have sufficient resources to allow for adequate command control communications during displacement (fig C-5).

METHOD OF DISPLACING A DS BATTALION FDC–SPLITTING THE BATTALION FDC FM RADIO NET COVERAGE.

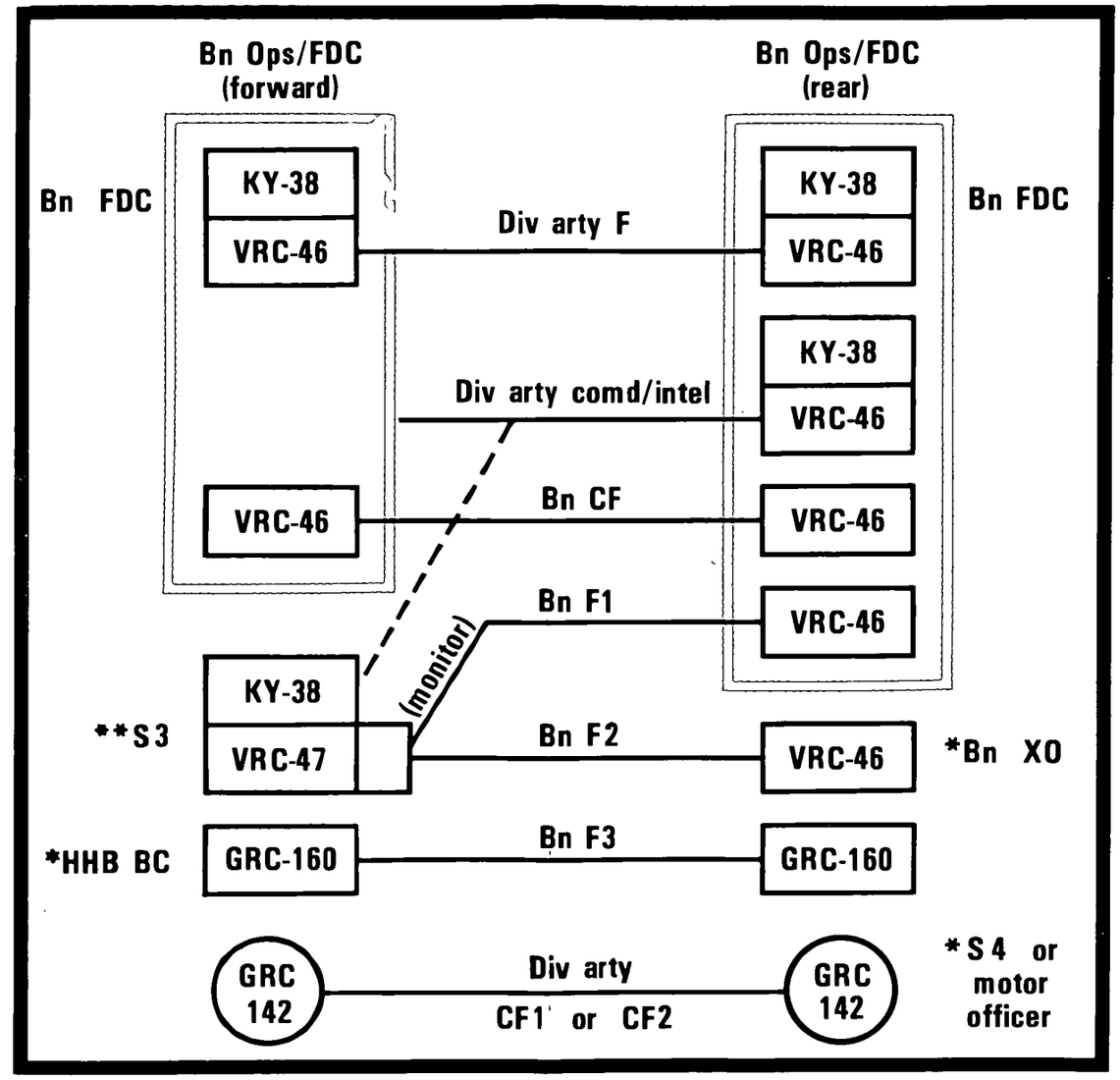


Figure C-5.

* Remote in FDC

**S3 KY-38 gives secure capability for div arty comd/intel net

An alternate method of displacing the battalion operations FDC is to use a designated battery as the battalion FDC. For active stations in each requirement, the battalion must augment the selected battery's radio strength (fig C-6).

METHOD OF DISPLACING A DS BATTALION FDC (AIM DIV) USING AN FA BATTERY DESIGNATED AS BATTALION FDC ALTERNATE FM RADIO NET COVERAGE

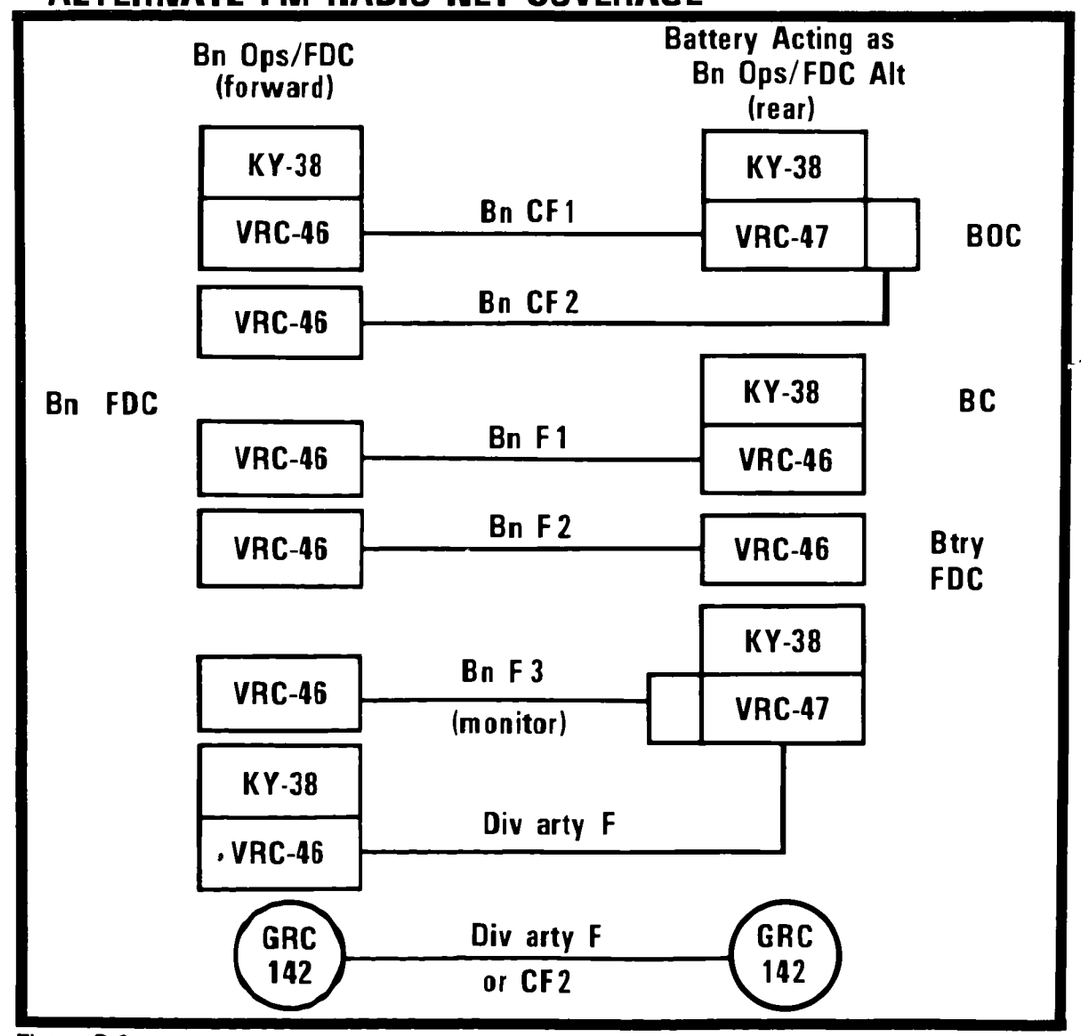


Figure C-6.

Divisional general support battalions. The divisional general support battalion's internal FM net coverage requirements are fewer than those of the DS battalions. The GS battalion uses a command fire direction net, one battalion fire direction net, and a retransmission frequency. The battalion's external FM net coverage is the same as the direct support battalion's. External AM coverage consists of the battalion operating on the division artillery CF2 AM/RATT net. If the battalion is assigned a mission of reinforcing or general support reinforcing to a direct support unit, the external net requirements increase. The battalion will operate on the reinforced battalion's CF1 net and the division artillery CF1 AM/RATT net if the battalion has the equipment to enter this net (fig C-7).

NORMAL FM RADIO CONFIGURATION TYPE GS BATTALION.

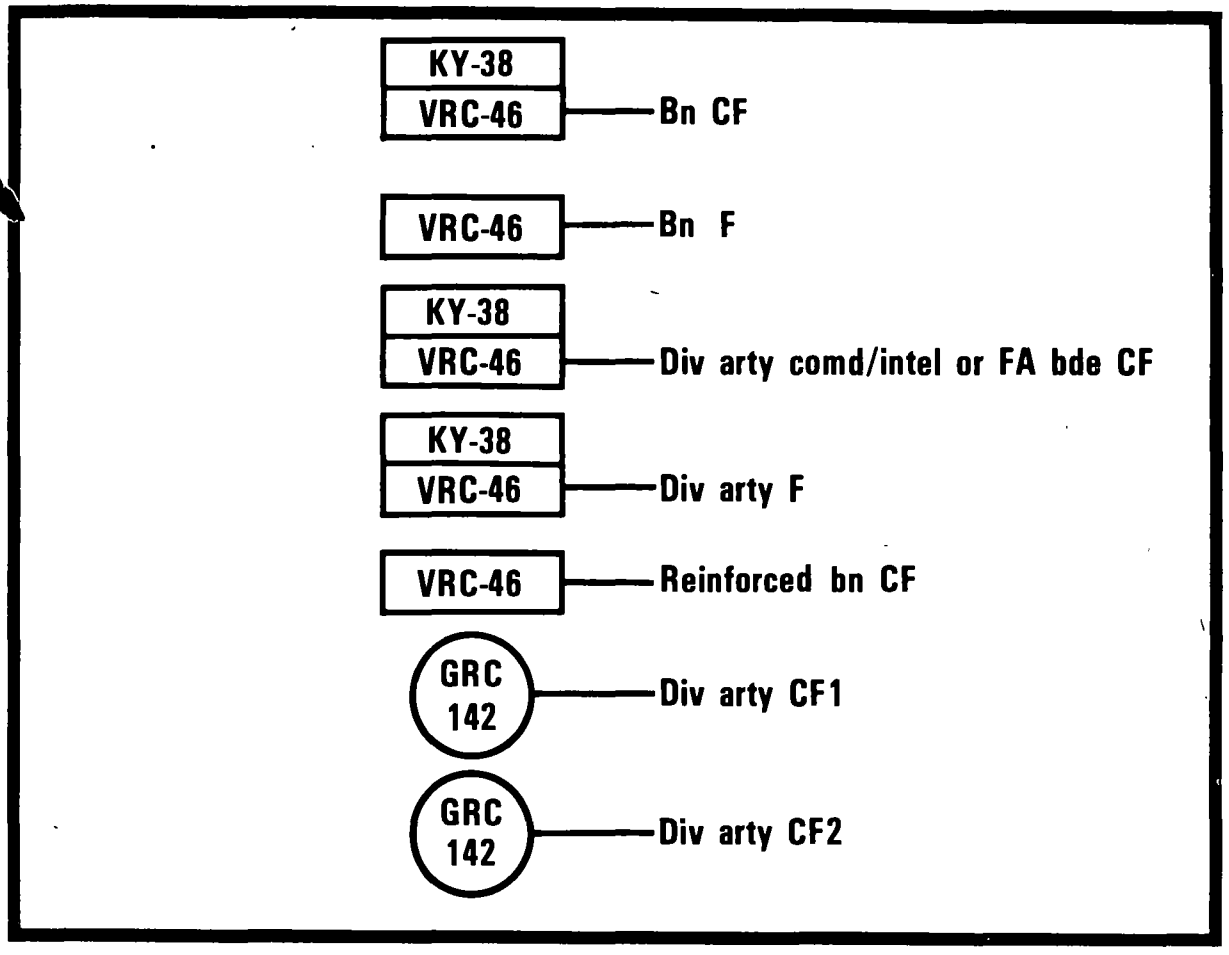


Figure C-7.

A general support TOE organized field artillery battalion, if required to assume a mission of direct support, can, through the redistribution of radios, operate in all nets normally associated with the direct support battalion (fig C-8).

TYPE GENERAL SUPPORT BATTALION RECONFIGURED TO A DIRECT SUPPORT BATTALION.

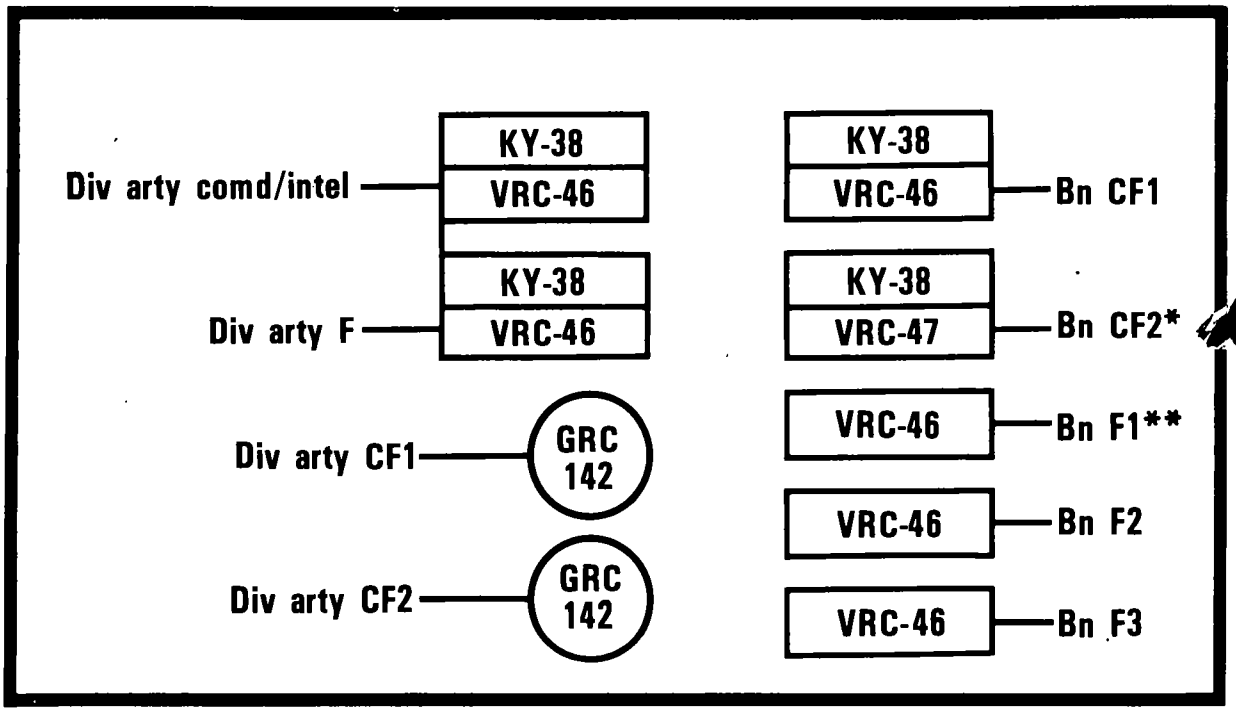


Figure C-8.

* S3's radio, remoted into FDC
** From bn assets, remoted into FDC

Wire communications. The GS battalions (divisional and nondivisional) will enter at the nearest entry point to obtain switched telephone entry into the division multichannel system. This point could be at a forward area signal center, maneuver brigade, division artillery, reinforcing field artillery brigade, or DS battalion.

Split FDC operation—GS. The same rationale for distribution of radio resources that applies to DS battalions holds true for a GS battalion. Available radios are those not deployed away from the battalion area with the liaison officer (fig C-9).

Nondivisional battalions. A nondivisional cannon battalion attached to the division artillery will operate on the same nets as a divisional general support battalion, depending on its mission.

A nondivisional cannon battalion assigned to a field artillery brigade will have the same basic net requirements as the divisional GS battalion in the general support role. The only difference in the nets is that the battalion monitors the field artillery brigade FM command fire net and AM/RATT nets rather than the division artillery nets.

DISPLACING A GS BN (MISSION GSR).

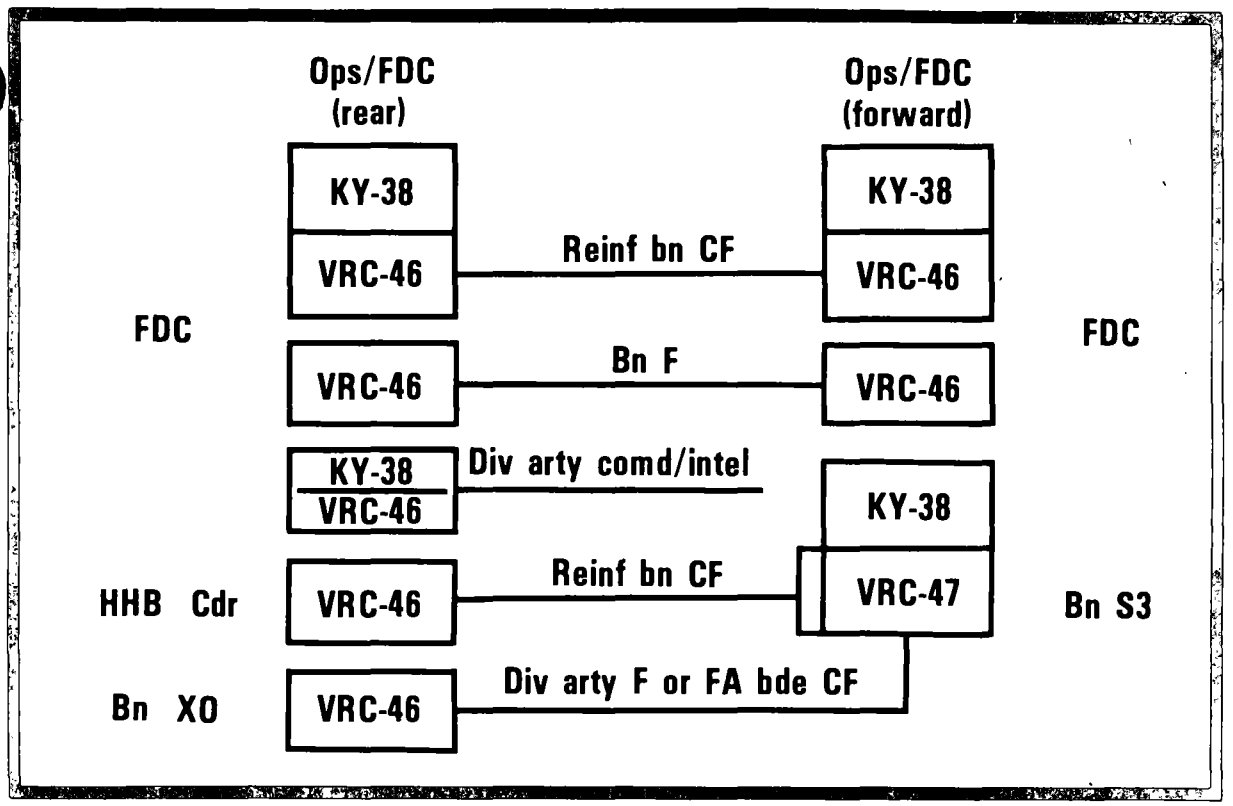


Figure C-9.

APPENDIX D:

The Cannon Battalion in Special Environments and in Support of Special Operations

For the cannon battalion, environments or operations are deemed special when terrain, weather, the nature of the support operation, or a combination of these factors creates a need for alternatives in field artillery tactics or techniques, and there is a requirement for special equipment or skills to support the force. *NOTE: References annotated by asterisk (*) are to be published.*

SPECIAL ENVIRONMENTS ARE:

PARAGRAPH	ENVIRONMENT	REFERENCE
D-1	Urbanized Terrain	FM 90-10*
D-2	Arctic	FM 90-11*
D-3	Desert	FM 90-3
D-4	Mountain	FM 90-6*
D-5	Jungle	FM 90-5*
D-6	Nuclear and Chemical	FM 100-50

SPECIAL OPERATIONS ARE:

PARAGRAPH	OPERATION	REFERENCE
D-7	Airborne and Airmobile	FM 90-2* and FM 90-4*
D-8	River Crossing	FM 90-13
D-9	Support of Allied Maneuver Forces	FM 100-5
D-10	Counterguerrilla	FM 90-8*
D-11	Amphibious	LFM-01

Many of the considerations and actions the battalion must execute to support maneuver forces in offensive and defensive operations are the same as those applied in these special environments and operations. The intent of the material presented in the following paragraphs is to highlight special considerations for cannon battalion support in these areas.

Military operations on urbanized terrain.

Four categories of the urbanized terrain environment confront field artillery planners.

- **Village—area with population of 1,000 or less.**
- **Strip area—area that connects a village with a town.**
- **Town (small city)—area with population of up to 100,000 but not part of major urban area.**
- **Large city—area larger than a town that may have a population in the millions and usually covers an area in excess of 100 square miles.**

SPECIAL CONSIDERATIONS FOR CANNON BATTALIONS SUPPORTING OPERATIONS ON URBANIZED TERRAIN

S2		S3						CESO	S1/S4
Target Acquisition	Met/Survey/ Registration	Fire Planning	Tactical Fire Control	Plans and Orders	Positioning	Reconnaissance	Displacement	Communications	CSS
Buildings can restrict visual and electronic observation. Maximum use is made of aerial reconnaissance platforms. Particular attention is paid to covering dead space with some target acquisition assets. Most targets are generated by maneuver.	Restricted line of sight impairs survey. Maps become outdated because of construction. High angle (HA) registration is used in the urban area. Registration should be to the rear if possible. Need for accurate met/survey/registration increases because most targets are point targets. Local service station maps are used if available.	High angle fires are common. FA fires are used to rubble and smoke many areas. Many small units will become isolated. Counterfire targets may be located in the urban area. FA fires are used to contaminate areas and deny use to the enemy. Fires are planned to block exits and reinforcements. Fires are planned to mask friendly movements. FA fires are used to flush out enemy to be attacked by other means. Assault fires may be used.	Effects of almost every weapon in lethality and range can be reduced. Delay fuzes will be used frequently. Variable time/dual purpose improved conventional munitions (VT/DPICM) is used to clear rooftop combat outposts (COP). White phosphorus (WP) is employed for incendiary effect.	Decentralized control of batteries may be required. S5 activities will increase.	FA units may be required to position in or near urban areas. Certain elements are positioned to support with direct fires on strongpoints. Positioning outside of urban area is preferable. Urban areas favor the defender. Separate gun section operations will become common.	Reconnaissance will be more difficult. Cover and concealment for concentrating forces is readily available. In large urban areas, the center and possible entrapment by rubble should be avoided. Extensive route reconnaissance is required.	Urban areas can restrict movement. Displacement may be by battery or gun section.	Building can reduce planning ranges for radios. Increased use of wire, messenger, and visual signals will be required. Radio retrans will be required. Low-power radios are remoted from upper floors of building to basement for increased range and survivability. Established civilian commo systems (e.g., police, cab, telephone exchanges) are used.	Munition consumptions will increase. Landlines of communications can be impeded.

CHARACTERISTICS OF URBANIZED TERRAIN OPERATIONS

- Difficult command control.
- Isolation of small units.
- Excellent cover and concealment.

Arctic environment.

The one environmental element having the greatest effect on military operations is the climate. The climate affects personnel, equipment, survivability, operational mobility, and general effectiveness.

EFFECTS OF WINTER ON MILITARY OPERATIONS

- Extreme cold and snow drastically impair effectiveness of troops and equipment.
- Extreme cold may force troops to spend much time surviving and very little time fighting.
- Snow blindness and long periods of reduced visibility and darkness can reduce direct observation capabilities.
- Deep snow can limit ground movement.

CHARACTERISTICS OF SUMMER

- Limited ground mobility during spring thaw.
- Long periods of daylight.

SPECIAL CONSIDERATIONS FOR CANNON BATTALIONS SUPPORTING OPERATIONS IN AN ARCTIC ENVIRONMENT

S2		S3						CESO	S1/S4
Target Acquisition	Met/Survey/ Registration	Fire Planning	Tactical Fire Control	Plans and Orders	Positioning	Reconnaissance	Displacement	Communications	CSS
Observation for ground FO can be restricted by snow, ice fogs, physical impairment (whiteouts/grayouts), and long winter nights. Aerial observation means provide surveillance to great distance.	Survey control is often absent and difficult to establish. Resection is used to locate positions. Abrupt temperature changes affect ballistics. The need for current met data increases. Maps may be inaccurate or outdated. Lack of good registration points may require HB/radar registration. Magnetic direction is unreliable.	The need for an effective SEAD program will increase. Smoke can lay close to the ground for hours. During winter nights, the expenditure of illumination rounds will be high.	During periods of heavy snow and spring thaw, munition effects will be reduced (especially ICM). Rates of fire are usually slower. Warmup rounds are needed more often.	Normally, batteries will be widely dispersed. Dissemination of plans and orders may be done by electronic means.	Frequent moves may be required due to the vastnesa of the battlefield. Firing platform stability is a problem. Emplacement in avalanche prone areas must be avoided. High priority must be placed on the establishment and maintenance of an effective air defense. Security must be increased during periods of reduced visibility. Positions must be hardened. Weapons, units, and occupied areas must be seasonally camouflaged and maintained.	Snowslides can be caused by artillery. Ice fogs can form over weapons and units, revealing locations.	Track and wheeled vehicles will have great difficulty operating during deep snow and spring thaw periods. Airmobility will have great importance.	Longer warmup periods are required for electronic equipment. Radios are often the primary communication means. Battery and wire life will be reduced during periods of extreme cold. Communications will be conducted over extended ranges. Electronic characteristics change, causing timing and power problems. Breath will freeze microphones; must use de-ice screen. Radio breathing or sweating may damage internal components. Ice must be kept off antennas. Displacement is slower because of frozen antenna connections. Grounding is difficult due to hard ground; may need to bore holes. Routine maintenance by operators is difficult due to small items to be handled in this weather.	Equipment is difficult to operate and increased malfunctions/breakages can be anticipated. Vehicles must be winterized. Improved landlines of communication may be nonexistent and greatly extended. More time will be required to perform even simple tasks. Clothing, shelters, tents, and other cold weather equipment must be available. Aerial resupply is essential. Slave cables are needed. POL requirements will increase (personal heaters, vehicle warmup). Ammo resupply is difficult due to greater distances and fewer routes.

Desert environment.

War in the desert is characterized by rapid, mobile operations. These fast-moving battles are more suitable to heavy forces than light forces. The heat and blowing sand will cause tremendous maintenance and personnel problems.

EFFECTS OF DESERT ENVIRONMENT ON MILITARY OPERATIONS

- **Wide temperature ranges affect personnel and equipment adversely.**
- **Periods of draught followed by flash flooding restrict surface movement.**
- **Duststorms affect movement.**
- **Weather changes (clear to sandstorm) are abrupt, sometimes closing down military operations.**
- **Camouflage and concealment in some areas are nonexistent.**
- **Attacks are made with the sun at one's back, low in the sky, or at night.**

SPECIAL CONSIDERATIONS FOR CANNON BATTALIONS SUPPORTING OPERATIONS IN A DESERT ENVIRONMENT

S2		S3						CESO	S1/S4
Target Acquisition	Met/Survey/ Registration	Fire Planning	Tactical Fire Control	Plans and Orders	Positioning	Reconnaissance	Displacement	Communications	CSS
FAAOs should be used whenever possible because depth perception is poor for ground observers. IR detection devices will work better at night. Detection of water resupply convoys is important. Location of ATGM and air defense artillery (ADA) sites is critical. Most targets will be highly mobile.	Astronomic observation may be used to establish a common grid. Survey control points will be few. Resection is used to locate positions. Maps may not be accurate or available. Good map readers are essential. Radars and high-burst registration will be common. Weather changes rapidly in morning and evening.	Final protective fires (FPF) will be used only to maintain key terrain. Offset firing techniques should be used. Suppression programs are essential, especially SEAD. Fires are planned on any key terrain.	Many smoke and illumination missions can be expected. HE ground burst effectiveness may be reduced.		Units will be dispersed. Position areas selected must not be stereotyped. Ingreas/egress routes are critical. Camouflage and concealment are of prime importance. Contours are used for positioning in defilade. Firing platform stability in the sand may be a problem. All-round security is a must. FA aound/flash explosive charge decoys are used. Terrain gun positioning is used.	Aerial reconnaissance will be normal.	Displacement may be frequent. Dead-reckoning techniques, sun compasses, and night celestial navigation will be required. Most movement will be at night. Noise and light diacipline are paramount. Cross-country mobility is excellent for track vehiclea and poor for wheeled vehicles.	Radio failures increase because of sand and temperature variance. AM planning ranges may be reduced. Unidirectional, horizontally polarized antennas are best. Antennas should be installed using counterpoise (artificial grounds). Visual comm (hand signals, flags) are good on clear days. Importance of OPSEC increases because of reliance on FM radio. Grounding is poor in the sand. Grounding plates should be buried and a salt solution poured in. Radio range increases near oases because underground water provides a good ground.	A larger supply of tires, filters, coolant, lubricants, and cleaning materials, and electrical spare parts is required. Increased water supply is a must. Night resupply will be common. Snakebite and anti-pest/insect kits are required. Survival training is required. Heat and burn cases will increase. Asbestos gloves are essential.

Mountain environment.

The important factors in mountain warfare are the need to control high terrain and restrictions caused by the geography. The geography restricts surface mobility, ground observation in some spots, positions available for field artillery, communications, avenues of approach, and large unit operations. On the other hand, it enhances fighting from high to low levels, using long-range organic fires from high spots, and ambushes on chokepoints.

Infantry forces, especially airmobile, are the most effective in mountains.

Available roads will be difficult to negotiate and cause many combat service support problems. Security for all convoys will be necessary. Use of air movements is to be expected.

CHARACTERISTICS OF OPERATIONS IN A MOUNTAIN ENVIRONMENT

- Communication restrictions and the need for retransmission.
- Increased need for high angle fires.
- Munitions effects reduced by the terrain.
- Maneuver units fighting from the top down.
- Small unit operations (platoon, company) being the norm.
- Maneuver forces relying heavily on indirect fires.

SPECIAL CONSIDERATIONS FOR CANNON BATTALIONS SUPPORTING OPERATIONS IN A MOUNTAIN ENVIRONMENT

S2		S3						CESO	S1/S4
Tsrget Acquisition	Met/Survey/ Registration	Fire Planning	Tactical Fire Control	Plans and Orders	Positioning	Reconnaissance	Displacement	Communications	CSS
Visual and electronic observation can be enhsnced or reduced dependent on terrain ussge. Maneuver generates more targets with ground surveillance radsr and sensors (REMS) on trails and valley floors. Use of FAAOs will increase. OPs are positioned at different heights.	Maximum use is made of triangulation survey techniques. May require HA registration. Met needed more frequently, since weather changes quickly. Survey must be accurate with emphasis on accurate altitude. Must monitor powder temperature frequently. Variance in altitude makes accurate transfer of fire difficult.	Support of small unit actions is common. Defensive fires are needed for security at night. Isolated units must have planned fires available. Snow and rock avalanches are used on enemy units. Alternate fire means are planned into artillery dead space. Artillery blocking fires combined with confining terrain may trap the enemy.	High angle fires will be required. Munition effects may be degraded. Unobserved fires sre used more frequently. Smoke is especially effective along valley floors in offensive operations.	FA units may be attsched to maneuver elements. Time and space factors sre considered in resupply. Positioning must be on key terrsin with commsnding fields of fire. Positioning to support isolated units and cover DS unit dead spsce is critical.	An attempt will be made to fight from the top down. Reverse slope position areas should be considered. Alternate positions are closer. All-round security is critical. Good cover and concealment must be available.	Reconnaissance may be accomplished by map or air. Map distance plus 1/3 equals actual ground distance.	Air transport may be used extensively for relocating units, FAAOs, retrans, and recons.	Wire should be used extensively. Retrans (AN/VRC-49) is used to overcome terrain/line-of-sight obstacles and is moved frequently to avoid detection. Enemy DF can be reduced by positioning of antennas using mountains as s mask. Continual comm with subordinste elements and adjacent and supported units msy be interrupted because of rugged terrain. Salt in rocky soil will improve the electrical ground.	Equipment loads should be as light as possible. Landlines of communication may be severely limited making resupply difficult. Physical conditioning is critical. Cold weather equipment may be required. Aerial resupply may be the norm. Heavy wear on carburetors, clutches, axles, and tires is expected. Fewer ti and VT fuzes are needed because of HA firing. Troops eat more. Increased altitude sickness is expected.

Jungle environment.

The two elements of jungle warfare having the greatest effect on military operations are climate and vegetation. These combine to restrict surface moves, observation, fields of fire, communications, surveillance, and target acquisition. Conversely, they enhance cover and concealment.

Equipment used in the jungle requires more constant and thorough maintenance than is needed in most other areas.

Light forces, supported by aviation, are the most productive in the jungle. However, elements of a heavy division may be used successfully in selected operations.

Road networks are usually scarce, unsecure, and pose a constant threat of enemy ambushes.

Air movements and air resupply operations may be required.

CHARACTERISTICS OF JUNGLE OPERATIONS

- **Restricted maneuver of mechanized forces.**
- **Rapid weather changes.**
- **Close combat.**
- **Extremely limited visibility.**
- **Difficulty in providing logistical support.**

SPECIAL CONSIDERATIONS FOR CANNON BATTALIONS SUPPORTING OPERATIONS IN A JUNGLE ENVIRONMENT

S2		S3						CESO	S1/S4
Target Acquisition	Met/Survey/ Registration	Fire Planning	Tactical Fire Control	Plans and Orders	Positioning	Reconnaissance	Displacement	Communications	CSS
Vegetation can restrict visual and electronic observation. Should consider placing radars on platforms to increase coverage. Should make maximum use of FAAOs. Sound ranging and adjustment may be required to supplement visual systems. Air and ground observers collaborate on adjustments. WP is used in first round to improve observation. Good use is made of illumination and night vision devices.	Maps may be outdated or inaccurate. Survey control may be difficult, if not impossible. Battalion observed firing chart techniques are used frequently. Radar registration is used often. Hasty survey methods are used.	FA fires will be used more often to mark targets for other fire support means. Small unit actions should be anticipated, but major actions can be expected. Hasty fire planning is more common. Fires are planned for position-oriented defense.	Time, VT, and ICM effects can be reduced by canopies. Requests for illumination fires will increase to support night operations. Desensitizing caps on VT are used. Delay fuze settings are used.	Batteries can be widely dispersed. There is increased use of frag orders.	Engineer support is required to establish/harden positions. Mutual support is desirable. Firing platforms for field artillery cannons are needed in some areas (riverine operations). Alternate and supplementary positions are located closer. Local all-round security must be established. Frequency of close combat will increase.	Excellent cover and concealment are available. There is increased emphasis on position defense measures to include direct fire.	Track and vehicle movement is restricted. Airmobility is of increased importance.	Planning ranges for radios may be reduced by foliage. Radio relays may be needed (airborne). Maintenance problems increase due to moisture/rust in communications. Battery life is shortened. Most radio equipment is to be manpacked. Wire deteriorates rapidly because of heat and humidity. Antenna radiating elements must be clear of jungle foliage.	Landlines of communication are difficult to maintain. Munition expenditure will be high. Health hazards due to disease will increase. Water supply is important; use of purification tablets is considered. High humidity will affect personnel and equipment. Maintenance needs increase in the jungle. Frequent operator maintenance is emphasized. Clothing and boots wear out often. Seals on ammunition powder must not be broken until needed.

Nuclear and chemical environment.

There are several functions that are adversely affected when operating in a nuclear and chemical environment. The overall result will be greatly reduced speed and responsiveness of the cannon battalion. Functions most affected are listed below.

- ***Positioning*** **will be characterized by wide dispersion to avoid wholesale loss of field artillery units as a result of an enemy nuclear and chemical attack. This causes a resultant decrease in ability to mass fires.**
- ***Logistics resupply*** **will be slowed down to avoid contaminated areas. Personnel work habits will be greatly affected by the use of protective equipment.**
- ***Communications*** **in the areas of a nuclear blast will be greatly affected by potential electromagnetic pulse effects.**
- ***Continual danger of radiation and chemical contamination*** **places an emphasis on early detection and treatment. Assignment of personnel to survey and monitoring teams and other nuclear, biological, chemical defense functions will affect unit operations accordingly. Details for use of chemical mission-oriented protective posture are in FM 21-40, *Chemical, Biological, Radiological and Nuclear Defense.***

Nuclear operations include the considerations listed in this section and the nuclear mission-oriented protective posture. MOPP is that portion of the unit tactical standing operating procedure that enumerates the specific actions to be taken to protect unit personnel and equipment should intelligence indicate the enemy is about to initiate the use of nuclear weapons or when the unit is to operate in a radiologically contaminated area. Detailed information on nuclear MOPP that can provide the basis for a portion of the TAC SOP is in FM 3-12, *Operational Aspects of Radiological Defense.*

The vulnerability of a unit to the nuclear threat can be decreased by the adoption of a specific nuclear MOPP category. Each category is described by one or more MOPP statements listed in the TAC SOP.

Examples of MOPP Statements

- **All radios except those in the fire direction center and tactical operations center will be turned off, disconnected from antenna and power source, and stored in an armored vehicle.**
- **Off-duty personnel will occupy foxholes with at least 18 inches of overhead cover.**
- **All messing will be accomplished only in enclosed areas.**
- **Radiological survey teams will monitor the area from date-time group to DTG.**
- **All vehicles will be closed to dust with all doors, windows, hatches, and canvas tightly secured.**

An example of category MOPP III in standing operating procedures might be a combination of the first three statements above.

Not all units will have the same nuclear MOPP category. The potential hazardous effects to the unit will determine the MOPP status. However, if the batteries are close enough, a battalion commander may choose to specify one category for all elements of the command. To facilitate the communication of the status, he may identify a common alphanumeric code taken from the CEOI, which will indicate a given status. Likewise, higher level commanders may also standardize a code for a given category.

SPECIAL CONSIDERATIONS FOR CANNON BATTALIONS SUPPORTING OPERATIONS IN A CHEMICAL/NUCLEAR ENVIRONMENT

S2		S3						CESO	S1/S4
Target Acquisition	Met/Survey/ Registration	Fire Planning	Tactical Fire Control	Plans and Orders	Positioning	Reconnaissance	Displacement	Communications	CSS
Effects can reduce visual and electronic observation. EEI and other intelligence requirements (OIR) change.	Survey msy take longer. Met data must be current. Nuclear registrations may be conducted.	Response times for conventional fire may be reduced. Increased nuclear state of readiness in accordance with (IAW) FM 101-31-2.		SOPs must contain immediate action status. Chemical, biological, snd rsdiological (CBR) reporting must be emphssized. Nuclear support plsns are reviewed.	Hardened position should be prepared. Positioning may be restricted due to contamination. Positioning will be critical, since a battalion may be responsible for firing a large portion of the pulse.	Recon may be conducted by map only. Passive measures for personnel and equipment are critical. A nuclear vulnerability anslysis may be desired. Dispersion may be increased.	Movement may be restricted. Displacements will be conducted on short notice. Preinitiation sensitive units msy be required to move from radiologically contaminated areas.	Wire, radio wire integration (RWI), visual signal, and messenger backup are required. EMP vulnerability is decreased.	Casualties will increase. Monitoring will be required. Resupply, for a period, may cease. Munition security increases. Redistribution of PNL may occur causing additional transport problems.

Airborne and airmobile operations.

Airborne. Airborne forces are available for introduction directly into battle over long distances from their home stations. Entries may be by parachute or air landing. Resupply is usually by air. Field artillery support for airborne forces in an airborne assault must be capable of parachute assaulting or air landing on field strips. Field artillery is usually attached to the supported forces. Direct support battalions accompany their supported brigades. Planning for airmobile assaults is usually done in a sequence, which is the reverse of the way things will happen. Planning first centers around what is needed in the objective area and works backward to the marshalling and loading phase. Factors that have serious effects on the outcome of airborne operations include weather, operations security, air movement means, enemy air defenses in the airhead area, and the fire support resources available. Linkup operations are also a major concern for planners.

Airmobile. A key factor in airmobile operations is the increased degree of mobility. This tactical mobility, not found in other units, gives a commander the ability to—

- **Rapidly concentrate, disperse, or redeploy forces.**
- **Influence a decisive point in battle quickly.**
- **Mount mobile counterattacks, screening actions, covering force operations, and surveillance and reconnaissance actions.**

However, there are the following tradeoffs for this mobility:

- **Limitations because of weather, aircraft availability, and lack of organic heavy artillery.**
- **Large requirement for logistical support.**
- **Vulnerability to air defense and electronic warfare systems.**
- **Helicopter lift capacity restrictions.**

Extensive training is required to execute an airmobile operation effectively.

SPECIAL CONSIDERATIONS FOR CANNON BATTALIONS SUPPORTING AIRBORNE AND AIRMOBILE OPERATIONS

Target Acquisition	Met/Survey/ Registration	Fire Planning	Tactical Fire Control	Plans and Orders	Positioning	Reconnaissance	Displacement	Communications	CSS
Requesting augmentation assets is considered. FAAOs will be required.	Survey control will be difficult. Frequent use is made of observed fire techniques. Weapon locating radar is used to register.	SEAD is critical. Close in and direct fires should be anticipated. Initial landing zones (LZ) will be out of artillery range. LZ preps must come from other FS assets planned by the appropriate fire support element (FSE).		Backward planning sequence should be used. Attachment to the maneuver force is frequent. Use of frag orders increases.	Initially, there will be little flexibility. Mutual support with other cannon units may be difficult. The battalion CP may be collocated with maneuver CP. All-round security must be provided.		Rapid movement will be by air. Terrain, weather, and visibility will impact significantly on movement. Control of batteries is decentralized during a move and regained after the move is completed. Forces are vulnerable during the initial landing at dropping zone (DZ) or LZ.	Radio will be the primary long-range communication. Air messengers will be required. Visual signals such as smoke and panels are used.	Resupply will be primarily by air. Sorties available will be limited. Visual markings of equipment can be helpful. Ammunition should be dropped beside the cannons. Units provide their own rigging and tie-down equipment.

River crossing operations.

The main considerations for a force involved in river crossing include the following:

- **Elements are canalized at crossing sites and become highly vulnerable.**
- **Crossing resources are usually limited, thus reducing courses of action available to the commander.**
- **Crossing sites need extra protection.**
- **During crossings, the force's combat power is divided between both banks of the river obstacle.**
- **Communications, command control, and traffic management are complex.**

The types of crossings requiring field artillery support include:

Hasty. The hasty crossing is characterized by detailed planning, decentralized control, speed and surprise, and minimum concentration of resources.

Deliberate. The deliberate crossing is usually used when the hasty crossing has failed or is impossible. This crossing is characterized by detailed planning, centralized control, a pause (assembly) on the near bank prior to crossing, concentration of resources, and the need to clear the enemy from the riverline.

Retrograde. The retrograde crossing is made under enemy pressure and is characterized by deliberate planning, centralized control, the enemy situation dictating maneuver actions, high risks, need for exit bank forces to provide overwatching fires, and a covering force to trade space for time.

SPECIAL CONSIDERATIONS FOR CANNON BATTALIONS SUPPORTING RIVER CROSSING OPERATIONS

S2		S3						CESO	S1/S4
Target Acquisition	Met/Survey/ Registration	Fire Planning	Tactical Fire Control	Plans and Orders	Positioning	Reconnaissance	Displacement	Communications	CSS
Visual means may be restricted due to smoke. TA assets are oriented on key overwatching terrain.	Hasty survey techniques may be required during hasty crossing. Registration to the rear may be used as part of the deception plan. During deliberate crossing, time is available for good survey.	Screening and obscuring smoke will be used extensively in support of selected crossing sites. Responsiveness is critical. Smoke is planned on "dummy" river crossing sites. Prep for dummy sites are part of deception plan. Fires are planned to neutralize the bridgehead (series, groups). Fires are planned to isolate the bridgehead. Illumination fires of crossing sites are planned if needed.	Illumination fires to assist observation at night must be coordinated to preclude exposure of troops in the crossing areas.	Plans may be detailed, but should allow for decentralized operation. Some GS units may fill DS roles temporarily while DS units are crossing.	Fire units will be well forward to range beyond the bridgehead area. Fire units will be positioned in depth. Positioning should facilitate rapid crossing.	Recon may be accomplished primarily by map. Counterattacks should be expected. Night occupations can be expected.	Fire units can expect to cross as soon as enemy small arms fire has been reduced on the far bank. Tank/mech units will not leave their organic gap crossing equipment in place. FA units require engineer support (armored vehicle launched bridge (AVLB)) to cross rivers.	During hasty crossings, radio will be the primary source of communication. Wire communications will be used as much as possible during deliberate crossings. Air messengers are used if possible. Communication is critical with unit on both sides of the river.	Munition expenditures will be high (smoke, illum). Large quantities of material may have to be palletized for cross-river transport.

Support of allied maneuver forces.

The United States has many standardization and mutual agreements already set up with potential allies in order to facilitate future operations. These agreements and standardization documents exist in the form of NATO Standardization Agreements, Quadripartite Standardization Agreements for the union of America, Britain, Canada, and Australia, and to a smaller extent through the use of Korean Augmentation to US Army Forces.

Operations with allied forces by out-of-sector units (one operating away from parent headquarters in an allied zone) are greatly affected in five areas.

Communications. Problems of language and availability of bilingual personnel, equipment differences, and terminology.

Allied fire support doctrine. Dissimilarity of tactical fire control procedures, field artillery missions, and fire coordination terms.

Identification of friendly forces. Recognizing friendly personnel and equipment as well as allied unit boundaries.

Combat service support. Providing the necessary ammunition, repair parts, and maintenance assistance for the out-of-sector unit.

Tactical nuclear operations. How the out-of-sector unit will support with nuclear firepower.

SPECIAL CONSIDERATIONS FOR CANNON BATTALIONS SUPPORTING ALLIED MANEUVER FORCES*

S2		S3						CESO	S1/S4
Target Acquisition	Met/Survey/ Registration	Fire Planning	Tactical Fire Control	Plans and Orders	Positioning	Reconnaissance	Displacement	Communications	CSS
Sound and flash equipment is similar; cross-training will tske little time. Allied force identifi-cstion is critical. Electronic target information is similar.	Cross-training is required. Host countries can normally provide survey parties. Universal transverse mercator (grid) (UTM) is NATO standard reference for survey. NATO met format is standard. Registration procedures and frequency may vary with different allies. Survey trig lists are exchanged with allied units in area of operations.	Common graphics, overlays, and maps are used extensively in joint planning sessions. Applicable STANAGs are reviewed and maintained. Call for fire format may be different among allies. Suppression mission is not used by NATO. Observer determines number of weapons and volume of fire to be used for smoke missions. US units may be called on to fire nuclear weapons for an allied commander. Dedicated battery concept not used by NATO.	Missions of GSR and reinf are different (see STANAG 2887). Federsl Republic of Germsny (FRG) units engage targets with battsllons, not batteries.	Plans and orders will be written in a five-paragraph field order format. By muiual agreement, plsns msy be in the language of the supported force. Need for translators or an extensive field standing opersting procedure (FSOP) of common words will be necesssry. Necessary classified documents must be made avsilable io allied commanders.	Engineer support is requested through NATO territorial force command channels. FRG units posilion all batteries in a 3 × 5 kilometer ellipse.			FM voice will be nonsecure. RATT is secure and can be geared to 66 words per minute (wpm). NATO CEOI and key-list are requested. Frequency range is 30-69 MHz. We may have to provide the supported force with crypto/ secure FM communicators. All communication systems/methods are coordinated. Challenge and psss-word cannot be the final determination of friendly or enemy identity. Rsdiotelephone operator (RTO) procedures are standardized (see STANAG 2867). It may not be possible to use the NEW SQUELCH ON position with low and medium power FM radios.	In most cases 155-mm projectiles and charges are compatible. Resupply rates and items must be made known. Host countries have a limited capability to repair radars, survey equipment, and radios. Interface between US and allied COSCOM may be necessary to insure adequate support. Fuels, lubricants, and some vehicles are common to US and allies.

*This outline incorporates STANAGs 2101 and 2129.

FOLDIN

Counterguerrilla operations.

Counterguerrilla operations are characterized by small unit operations, no established lines of battle, difficulty in identifying the enemy from the local population, and difficulty in fire support coordination.

FACTORS AFFECTING COUNTERGUERRILLA OPERATIONS

- **Heavy vegetation in areas of operation.**
- **Enemy units hiding in civilian areas (villages, towns).**
- **Lack of good security.**
- **Target acquisition limitations.**

SPECIAL CONSIDERATIONS FOR CANNON BATTALIONS SUPPORTING COUNTERGUERRILLA OPERATIONS

S2		S3						CESO	S1/S4
Target Acquisition	Met/Survey/ Registration	Fire Planning	Tactical Fire Control	Plans and Orders	Positioning	Reconnaissance	Displacement	Communications	CSS
Targets will be fleeting and difficult to locate accurately. Night vision devices and sensors must be used.	Survey control will be difficult. Hasty survey techniques will be used frequently. FAAOs may be required for registration.	Requests for illumination to support night operations will be high.	Munition effects can be reduced in built-up and heavily vegetated areas. No-fire areas and free-fire areas will be used frequently.	Plans must consider civil affairs aspects. Planning must take into consideration the fact that units may be widely dispersed and command control may be difficult.	Natural and man-made features may restrict positioning alternatives. Fire units may be positioned with maneuver forces. Frequent use of earthmoving equipment to harden positions may be required. Position should be hardened to withstand fire and infantry attack. All-round security must be maintained.	Positions should provide for 6,400-mil fires.	Movement may be by land and/or air. Frequent displacement will be common.	Radio relays may be required. Wire is subject to being cut/monitored by guerrillas. Any isolated retrans sites will need additional security. Extensive use is made of authentication.	Resupply may be done primarily by air. Munition expenditures will be high. Landlines of communication may be difficult to maintain. Effects of weather must be considered when planning resupply activities.

Amphibious operations.

One factor having a great effect on these military operations is the requirement for detailed coordination with other services (Air Force, Marine Corps, Navy). This is reflected in the need for concurrent planning between the landing force and the amphibious task force and the coordination involved in the shift of fire support responsibility from the amphibious task force to the landing force.

Military operations will be conducted according to written doctrine once the commander, landing force, takes over responsibility for the battle from the commander, amphibious task force.

CHARACTERISTICS OF AMPHIBIOUS OPERATIONS

- The element of surprise inherent with mobility of the attacker.
- Reverse planning.
- Joint operations.
- Requirements to build up combat power ashore from zero to full coordinated striking power.
- Detailed planning among different type units.

SPECIAL CONSIDERATIONS FOR CANNON BATTALIONS SUPPORTING AMPHIBIOUS OPERATIONS

S2		S3						CESO	S1/S4
Target Acquisition	Met/Survey/ Registration	Fire Planning	Tactical Fire Control	Plans and Orders	Positioning	Reconnaissance	Displacement	Communications	CSS
Initial targeting data will come from Naval sources. Most targets will come from FIST/ FSOs initially. FAAOs are used extensively.	Survey data will be difficult to obtain until a beachhead is established. Hasty survey is used. Hasty registration is used or GFT setting is obtained from adjust fire missions. Prior coordination with landing force headquarters for available survey information is vital. Ballistic met support may be obtained from USN shipboard met stations in NATO format.	Enemy AD assets must be suppressed. Initial fire planning with naval gunfire (NGF) and CAS. Interservice calls for fire will be common. CATF/CLF do concurrent planning. Lack of good intelligence may place reliance on hasty fire planning.	Tactical and technical fire control will be decentralized initially.	Frag orders will be the norm on the beach. Decentralized control during initial phases of assault is used.	Initial shore positioning should be out of enemy small arms range, if possible. Terrain positioning will be vital. Consideration for firing on sand is important. FA assets may initially be positioned on an offshore island.	Initial recon will be the result of map and aerial reconnaissance. Weapons and units will be extremely vulnerable during the early stage of the beach assault. Advance parties arrive with assault units.	The battalion may be attached to a maneuver unit during passage and beaching. Firing elements enter as early as situation permits. Some FA assets may be inserted by helicopter.	Radios will provide ship-to-shore communication. Wire should be laid as soon as possible after beaching. Extensive planning/ coordination for interservice use of frequencies, call signs, operations calls, and cipher systems is needed. Tactical radios need protection against saltwater. Tactical radios are checked for operation (i.e., open net) prior to landing. Units providing supplementary fires must be provided the necessary CEOI.	Resupply and evacuation functions will be done by ship, plane, or helicopter. Munition expenditure will be high. Care must be taken in unloading ammunition and distribution to units by proper caliber. Assault units arrive with basic load divided among sections.

APPENDIX E:

Road Marches

At times a unit not in support of maneuver operations may have to move long distances to be in position for future combat operations or to get from garrison to a distant training area. These movements are called road marches.

The purpose of this appendix is to provide information on how to plan a road march in wartime or peacetime.

Road March Planning Considerations

MISSION:

- How far must the battalion move?
- How soon must it arrive at its destination?
- What is it to do when it gets there?
- Is it moving as a part of a larger force?

ENEMY:

- What is the likelihood of enemy ground contact?
- What is the likelihood of enemy air attack?

TERRAIN:

- What routes are available?
- Are they primary or secondary routes?

TIME AVAILABLE:

- A road march should be planned in as much detail as time permits to minimize the possibility of vehicles becoming lost and to provide for efficient movement. In peacetime, it may be necessary to plan road marches in great detail due to administrative and safety restrictions. In wartime, time and the mission may not allow detailed planning.

Planning.

Road march planning includes three steps that may be done concurrently: determine movement requirements, analyze organic and nonorganic movement capabilities, and establish unit movement priorities.

MOVEMENT PLANNING FACTORS

- **Organization of units and their equipment.**
- **Assembly of units and transportation means.**
- **Loading personnel and equipment.**
- **Enemy situation, geographic conditions, and weather.**
- **Control, coordination, and combat service support for the movement.**
- **Security measures before, during, and after the movement.**
- **Assembly of units and equipment at the destination.**

Training.

The success or failure of a mission could very well depend upon the ability of units to move rapidly and efficiently over great distances. Training is necessary to test and check unit loading plans, to develop and improve standing operating procedures, to prevent wasted time and effort, and to maintain operational efficiency. The battalion should integrate road marching and occupation of position areas into other types of training whenever possible.

Standing operating procedures.

The battalion should develop an SOP for road marches and occupation of position areas. Some routine items that may be included in the SOP are loading plans, serial and march unit composition, control measures, rates of march under various conditions, formations, communications, security measures, time intervals and distances, location of the command post during the march, timing and duration of halts, tasks during halts, organization of quartering and reconnaissance parties, and reporting instructions.

Similar vehicles used for similar purposes should have the same stowage plan for equipment and ammunition. This prevents confusion during combat operations, when personnel must move from one vehicle to another, and during recovery operations. Sectors of fire for each vehicle-mounted weapon and Redeye should be prescribed throughout the column. Orders for a particular movement need only modify or amplify the SOP to fit the requirements of a particular situation.

Preparing for road marches.

March planning sequence. When preparing for a tactical road march, the following march planning sequence should be used if time permits:

Prepare and issue the warning order as soon as possible to give batteries maximum preparation time. Include reconnaissance party instructions.

Organize and dispatch reconnaissance and quartering parties (should follow SOP).

Prepare detailed movement plans to:

- **Organize the march.**
- **Review reconnaissance information.**
- **Compute march data.**
- **Prepare a movement table.**

Prepare and issue the march order.

Route reconnaissance. Route reconnaissance determines travel times, underpass heights and bridge capacities, and culvert, ferry, and ford locations and identifies critical points and obstacles. Locating critical points before the march can prevent congestion and enhance security.

A route reconnaissance can confirm and supplement data obtained from map studies, higher headquarters, and air reconnaissance.

Instructions to the route reconnaissance party should state what information is required and when and where the report is to be submitted.

Quartering party (advance party). A quartering or advance party should precede the main body whenever possible. Normally, it is composed of an officer in charge, a security element if the tactical situation requires, communication and medical personnel, plus necessary staff section and subordinate representatives. Its mission is to reconnoiter the new area, make necessary improvements to entrances and routes in the area, and guide march elements to and into the new area. It may also perform route reconnaissance when time is critical. The officer in charge of the quartering party must know the route, order of march, and when the main body will arrive. A battalion quartering party usually consists of the quartering parties from each subordinate battery and a security element.

It is desirable that the same soldiers be used regularly on quartering party assignments. The quartering party should have sufficient guides and markers and necessary equipment to perform work in the new area. As march elements arrive and clear the release point, quartering party members guide them to selected or designated areas without stopping.

March columns.

A road march may be close column, open column, or by infiltration. March techniques may be varied depending on the situation. In dusty conditions, for example, vehicles must march at least dust distance away from one another for drivers to see.

Close column. Normally, vehicles are spaced approximately 25 meters apart during daylight. At night, vehicles are spaced so that the driver can see two lights in the blackout marker of the vehicle ahead. Close column is usually used for marches during darkness, under blackout conditions. This method of marching takes maximum advantage of the traffic capacity of the routes but provides little dispersion. Vehicle density is approximately 30 vehicles per kilometer along the route of march.

Open column. Distance between vehicles is increased to provide greater dispersion and varies from 50 to 100 meters, or greater if the situation requires. Normally, open column is used during daylight. It may also be used at night using infrared lights or blackout lights or when passive night vision equipment is available. Normal vehicle density is approximately 15 vehicles per kilometer when vehicles are 50 meters apart, 12 vehicles per kilometer when the distance is 75 meters, and 10 vehicles per kilometer when the distance is increased to 100 meters. In choosing interval or density, the planner must realize the effect of column length and the time it will require to move. In close column, a 155-mm SP cannon battalion is 3 km long; in a 100-meter open column, it is 10 km long.

Infiltration. Vehicles are dispatched individually, in small groups, or at irregular intervals at a rate that will keep the traffic density down and prevent undue massing of vehicles. Often the advance party is infiltrated.

Infiltration provides the best possible passive defense against enemy observation and attack. It is suited for tactical marches when sufficient time and road space are available and when maximum security, deception, and dispersion are desired. This method makes control difficult and increases the chances of losing vehicles. Infiltration is comparatively slow and complex and should be used only when the enemy threat makes it essential.

March organization.

A march column includes all elements using the same route for a single movement under control of a single commander. A battalion may march over multiple routes to reduce closing time. A large column may be composed of a number of subdivisions, each under the control of a subordinate commander. March columns, regardless of size, are composed of three elements: a head, a main body, and a trail party. March columns are organized to maintain unit integrity and to maintain an organization consistent with mission requirements.

Head. The head is the first vehicle of the column and sets the pace.

Main body. The major elements of the march column are serials and march units and constitute the main body.

A ***serial*** is a major subdivision of a march column, organized as a single unit under one commander for purposes of planning, regulation, and control. A battalion usually forms into a serial.

A ***march unit*** is a subdivision of a serial and is normally a section, platoon, or battery. It moves and halts under control of a single commander using voice, visual signals, or radio when no other means of communication can be used.

Trail party. The trail party follows the march column and includes personnel and equipment necessary for emergency vehicle repair and recovery, medical aid and evacuation, and unscheduled refueling. The trail party must have FM radio communications.

March column control.

Column control is maintained through the chain of command. The *commander* has no prescribed place in the column but positions himself where he can best control the operation or where problems are likely to occur. Commanders of serials and march units are responsible for controlling their elements. Ground vehicles, aircraft, route marking guides, and military police may be used to assist in controlling the march.

Each unit marching as part of a larger element maintains liaison with the preceding unit. When appropriate, a liaison officer travels with the preceding unit, keeps his commander informed of that unit's location, and provides him early warning and reason for any unscheduled halt.

Normally, movement control is enhanced by an understanding of the following factors.

Start point. An SP provides all units of a march column a common point for starting their movement. When units use more than one route, each route has a start point. The SP is a place along the route of march that is easily recognizable on the ground, such as a road intersection. An SP should not be a defile, on a hill, or at a sharp curve in the road. It should be far enough from assembly areas to allow units to be organized and moving at the prescribed rate when it is reached. No element of a march column should be required to march to the rear or through another unit to reach it. Before starting a march, each major unit of a serial reconnoiters its route to the SP and determines and announces the times for elements of its serial to arrive at and clear the start point.

Release point. An RP provides all units in the march column a common point for reverting to their parent unit control. The RP should be on the route of march and easily recognizable on both the map and the ground. Guides should meet units as they arrive at the RP and lead them to their new areas. Multiple routes and cross-country movement from the RP to assembly and position areas should be used to enable units to disperse rapidly. In selecting an RP, such terrain features as hills, defiles, and sharp curves should be avoided. Furthermore, no unit should be required to countermarch or pass through another unit to reach its new position.

Critical points. Critical points on a route are those points used for reference in providing instructions, places where interference with movement might occur, such as road junctions, or places where timing might be a critical factor. The route reconnaissance report or a map study should permit the march planner to designate critical points along the route of march and distances from one critical point to another. There should be uninterrupted movement through each critical point. Road guides and signs assist in this endeavor; the presence of the commander and other key personnel at some critical points assists in movement control.

Restrictions. Restrictions are points along the route of march, such as bridges, intersections, ferries, or bypasses, where movement may be limited or obstructed.

The march planner should coordinate the move to avoid unnecessary delays. This can be accomplished by starting the move earlier, delaying the start of the move, planning to halt the column along the route, or taking some other action such as using other routes to avoid the restriction.

Communications. Messengers, road guides, and personal contact are the standard means of communications used during road marches. Visual signals are also useful for small elements. Because the enemy has good radio direction-finding equipment, radio should be used in emergencies only and only if no other means of communication can be used. Road guides are ideally suited to pass messages from one march unit to a following march unit. Because of the need to avoid use of the radio, road guides are key to controlling the speed and interval of march units.

Traffic control. Traffic control is provided by the headquarters controlling the march. Military police traffic control posts may be located at critical points along the route to provide orientation and to minimize delays caused by other columns, civilian or refugee traffic, congested areas, or difficult terrain.

Road guides may be used to augment and support the military police effort. Road guides should be posted in pairs, one to direct traffic while the other provides security. Their equipment should provide for identification during hours of darkness. Normally, guides are posted by an advance party of the moving unit. They should be well briefed and should insure that they direct only vehicles from their unit.

Movements on multiple routes during periods of poor visibility and the existence of major intersections, defiles, and detours along routes increase traffic control problems.

Speed control. Elements in a column of any length may encounter many different types of routes and obstacles simultaneously, resulting in different parts of the column moving at different speeds at the same time. This can produce an undesirable accordion-like action or whip effect. The movement should direct the maximum catchup speed to reduce "column whipping."

To control whipping, the lead vehicle must not exceed the authorized maximum speed of the slowest vehicle in the column. To minimize vehicle congestion on the near side of an obstacle, both vehicle commanders and drivers must be alert and maintain the prescribed minimum distance between vehicles. The standard 2-minute intervals should also be maintained between march units.

Halts. Halts are made for rest, personal comfort and relief, messing, refueling, maintenance, inspection of equipment, allowing other traffic to pass, and making adjustments in schedules. Usually, the time and duration of halts are established in the movement order or prescribed in the unit SOP.

Short halts for rest usually are taken for 15 minutes after the first hour of marching and for 10 minutes every 2 hours thereafter. The prescribed rate of march includes the time required for short halts. When possible, march elements using the same route should stop at the same time; however, route

characteristics may make it necessary for the halt to occur in one particular part of the route rather than all elements stopping at a fixed time.

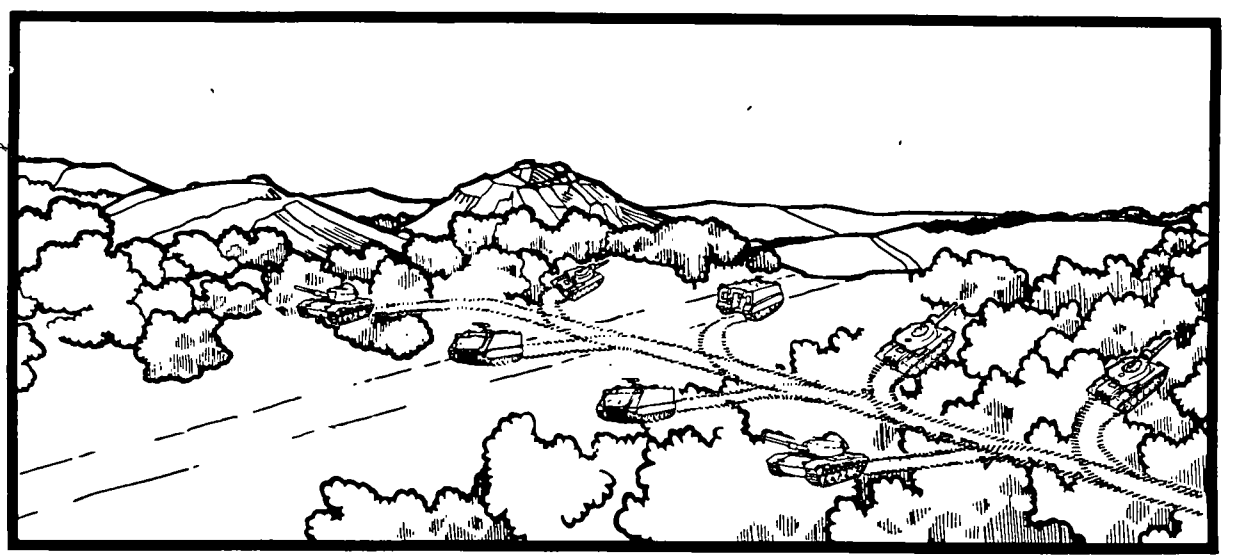
Long halts are planned in advance requiring that additional time be specifically allocated and added to the total travel time. Normally, locations for long halts are selected to allow all vehicles to clear the road and permit proper dispersion.

Unit SOPs should prescribe actions to be taken during halts such as the performance of during-operation maintenance services. Whenever unscheduled halts occur, vehicle commanders should take appropriate action to determine and eliminate the cause of the halt.

Halts for refueling should be scheduled in advance to enable the march unit commander to make definite plans for refueling.

It may be desirable to clear the route of march temporarily to shorten the column. When terrain permits, units do this by coiling up on each side of the route. A coil is a circle with weapons oriented outward. If sufficient area is not available or condition of the terrain precludes coiling, a herringbone is formed.

FORMING A HERRINGBONE



The first priority at a halt is to establish local security. Observation posts are established and sectors of fire are assigned to each section or element.

Disabled vehicles. Disabled vehicles must be moved off the road to avoid obstructing traffic. The crew of the disabled vehicle establishes security, posts guides to direct traffic, and reports their status. If the crew is able to repair the vehicle, it rejoins the *rear* of the column. Vehicles that have been dropped from the column for any reason should be returned to their positions only when the column has halted. Until then these vehicles are put at the rear of the column, just ahead of the trail element. If the crew

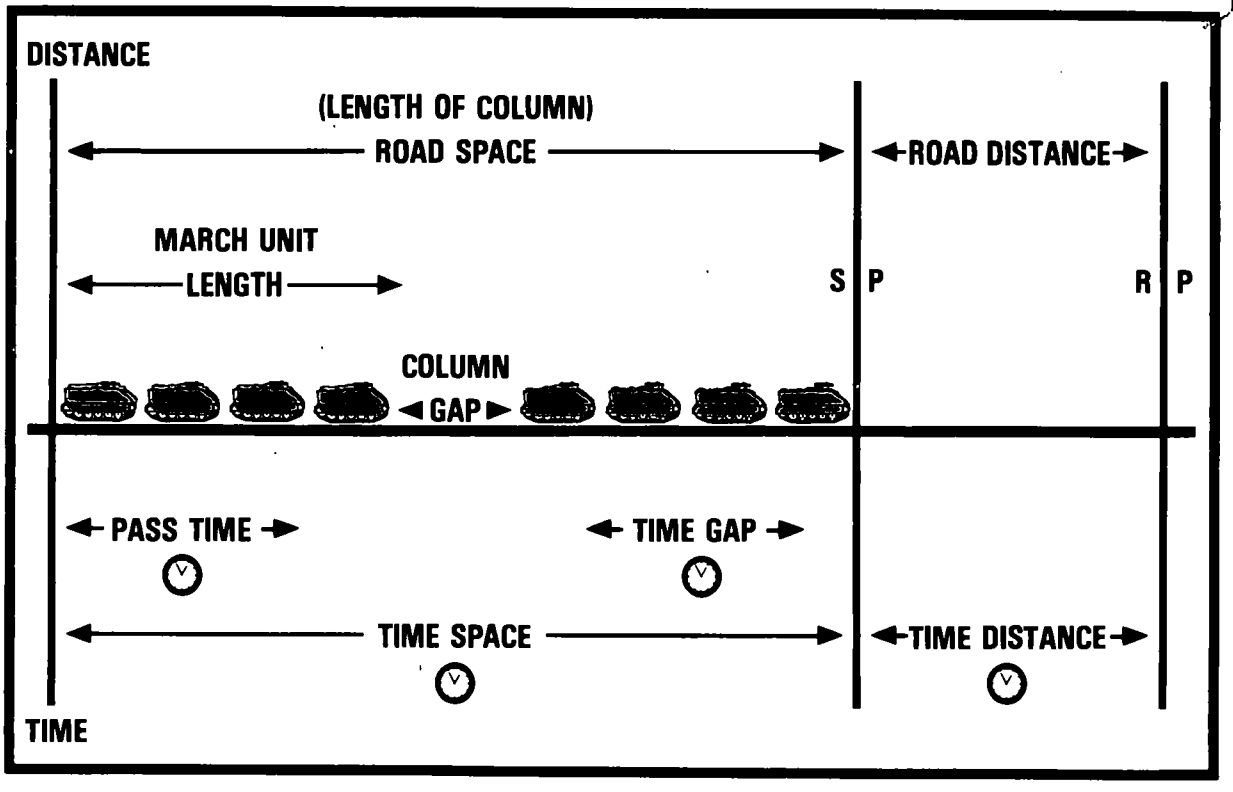
cannot repair the vehicle, the vehicle is recovered by the trail party.

Road march planning factors.

An understanding of certain march terms is necessary in order for the planner to develop detailed movement plans. These terms, together with basic factors of distance, rate, and time are transformed into movement formulas. Formulas are applied to known data to derive information necessary to prepare a time schedule. The time schedule is used to regulate departures and arrivals of march elements.

Time and distance relationship. Relationships between time and distance are the basis for march planning. The planner must determine how far the column is to travel (distance) and how long it will take to make the move (time). He must know the space (length of column) the column will occupy on the route. He must also include in his computations the safety factor of distance (road gap) or time (time gap) that must separate march columns and their elements. Each term used for distance has its corresponding term for time. The length of a column in kilometers has an equivalent pass time in minutes; the road distance, kilometers or miles, has a corresponding time distance. The relationship between time and distance is as shown below.

TIME DISTANCE RELATIONSHIPS



Distance factors.

Vehicle distance is space between two consecutive vehicles of an organized element of a column.

Column gap is space between two organized elements following each other on the same route. It can be calculated in units of length or in units of time as measured from the rear of one element to the front of the following element.

Traffic density is the average number of vehicles that occupy 1 mile or 1 kilometer of road space, expressed in vehicles per mile or vehicles per kilometer.

Length of a column is the length of roadway occupied by a column, including gaps in the column, measured from front to rear.

Road gap is distance between two march elements. It is the length aspect of column gap, and since it is more significant when the column is moving than when it is halted, it becomes a factor of time rather than distance.

Rate factors.

Speed indicates actual rate of speed of a vehicle at a given moment as shown on the speedometer (in kilometers per hour or miles per hour).

Pace is regulated speed of a column or element, set by the lead vehicle, to maintain the prescribed average speed.

Rate of march is average number of miles or kilometers traveled in any given period of time, including short periodic halts and other short delays. It is expressed as miles or kilometers in the hour.

Time factors.

Arrival time is the time at which the head of the column arrives at a designated point.

Clearance time is the time at which the tail of a column passes a designated point.

Completion time is when the last vehicle of a column passes the release point.

Extra time allowance of 1 minute per 25 vehicles is always allocated above the calculated pass time (within a column moving under one identification serial number). In a column where the number of vehicles is over 600, the EXTAL will be 2 minutes per 25 vehicles. A serial of less than 25 vehicles is not allotted any extra time. EXTAL is equitably added to march unit pass times within a serial.

Pass time of a column is actual time between the moment the first vehicle passes a given point and the moment the last vehicle passes the same point.

Road clearance time is total time a column requires to travel over and clear a section of road. Road clearance time equals time distance plus column pass time.

Time distance is time required to move from one point to another at a given rate of march. It normally represents the movement of the head vehicle of the column from the start point to the release point.

Time gap is time measured between rear and front of successive vehicles of elements as they move past any given point. It is the time aspect of column gap and may also be the conversion of road gap to time. There are no prescribed standard gaps. These depend on the size of serials and march units, the time available for the movement, and the tactics required for protection against air and nuclear attack.

Application of movement formulas. Distance, rate, and time are the basic factors for movement computations. If two of these factors are known, the third may easily be found by dividing or multiplying one by the other.

Rate is determined by dividing distance by time: $R = \frac{D}{T}$

Distance is found by multiplying rate by the time: $D = R \times T$

Time is calculated by dividing distance by the rate: $T = \frac{D}{R}$

The march planner must determine pass time, time distance, arrival time, and completion time.

Pass time. Pass time is calculated by dividing the total number of vehicles multiplied by 60 by vehicle density multiplied by speed. To this figure are added EXTAL (see below) and time gaps between march elements. This formula may be used to calculate pass time for an entire serial or march column quickly.

Pass time formula

$$PST = \frac{\text{No. of veh} \times 60}{\text{Density} \times \text{speed}} + \frac{\text{No. of veh}}{25} + \text{Time gaps (min)}$$

EXAMPLE:

Determine time distance of a serial traveling 135 kilometers at a speed of 24 kmph (rate of march 20 kmlh).

$$PST = \frac{150 \times 60}{15 \times 24} + \frac{150}{25} + (2 \times 5)$$

$$= \frac{9000}{360} + 6 + 10$$

$$= 25 + 6 + 10$$

$$PST = 41 \text{ minutes.}$$

Notes. 1. Round up fractions of minutes to next higher whole minute.

2. Extra time allowance is allocated on the basis of 1 minute per 25 vehicles added to *serial* pass time. EXTAL is equitably added to pass time of each march unit in the serial.

A *pass time table,* together with the extra time allowance table, can simplify march planning. To prepare the time schedule for a *serial,* it is a simple process to determine pass time for any march unit regardless of vehicles, traveling speed, or column density. Extra time allowance is then added to calculated pass time to determine total pass time.

Pass time for a *serial* is determined by adding march unit pass times together, including the time gaps between march units. Examples are shown in figure E-1 below.

Figure E-1.

The Pass Time Table is used in conjunction with the Extra Time Allowance Table to calculate the pass times for single march units of a battalion task force serial. The PST Table is based upon the number of vehicles in the march unit (density), the interval between the vehicles, and a specified vehicular speed. The figures in this table are expressed in *minutes* and *seconds.* The Extra Time Allowance Table provides the EXTAL in minutes based upon the number of vehicles (density) in the march unit.

EXAMPLE 1.

Determine the PST for a march unit of 29 vehicles at 50-meter intervals traveling at a speed of 40 kmph. Use the 40 kmph—25 mph division of the table and select the 50-meter interval 15 vpkm column. Find the PST for 25 vehicles, which is 3 minutes. Next, find the PST for 4 vehicles, which is 29 seconds. Add the 3 minutes and the 29 seconds, then round to the next higher minute for a total of 4 minutes.

Finally, using the EXTAL Table, determine the EXTAL for 29 vehicles, which is 1 minute. Add 1 minute EXTAL to the 4 minutes PST for the march unit pass time of 5 minutes.

To calculate the pass time for a battalion task force serial, add the march unit pass times together and include the time gaps between the march units. There will always be one less time gap than march units.

EXAMPLE 2.

Determine the PST for a serial of four march units, each with a PST of 5 minutes and a time gap of 2 minutes. Add 5 minutes (MU1) + 2 minutes (time gap) + 5 minutes (MU2) + 2 minutes (time gap) + 5 minutes (MU3) + 2 minutes (time gap) + 5 minutes (MU4) = 26 minutes total serial PST.

PASS TIME TABLE (SINGLE MARCH UNIT)

Number of Vehicles in March Unit	PASS TIME (MINUTES AND SECONDS)																							
	16 kmph—10 mph				24 kmph—15 mph				32 kmph—20 mph				40 kmph—25 mph				48 kmph—30 mph				56 kmph—35 mph			
	Interval—Meters				Interval—Meters				Interval—Meters				Interval—Meters				Interval—Meters				Interval—Meters			
	25	50	75	100	25	50	75	100	25	50	75	100	25	50	75	100	25	50	75	100	25	50	75	100
	30 vpk	15 vpk	12 vpk	10 vpk	30 vpk	15 vpk	12 vpk	10 vpk	30 vpk	15 vpk	12 vpk	10 vpk	30 vpk	15 vpk	12 vpk	10 vpk	30 vpk	15 vpk	12 vpk	10 vpk	30 vpk	15 vpk	12 vpk	10 vpk
1	:08	:15	:19	:23	:05	:11	:13	:15	:04	:08	:10	:12	:04	:08	:08	:09	:03	:05	:06	:08	:03	:05	:06	:06
2	:10	:30	:38	:45	:11	:20	:26	:30	:08	:15	:19	:23	:08	:15	:15	:18	:05	:11	:13	:15	:05	:09	:11	:13
3	:23	:45	:57	1:08	:15	:30	:38	:45	:12	:23	:29	:34	:11	:22	:23	:27	:08	:15	:19	:23	:07	:13	:17	:20
4	:30	1:00	1:15	1:30	:20	:41	:50	1:00	:15	:30	:38	:45	:15	:29	:30	:36	:11	:20	:26	:30	:09	:18	:22	:26
5	:38	1:15	1:34	1:53	:26	:50	1:03	1:15	:19	:38	:47	:57	:18	:36	:38	:45	:13	:26	:32	:38	:11	:22	:27	:33
6	:45	1:30	1:53	2:15	:30	1:00	1:15	1:30	:23	:45	:57	1:08	:22	:44	:45	:54	:15	:30	:38	:45	:13	:26	:33	:39
7	:53	1:45	2:12	2:38	:35	1:11	1:28	1:45	:26	:53	1:06	1:19	:26	:51	:53	1:03	:18	:35	:44	:53	:15	:30	:38	:45
8	1:00	2:00	2:30	3:00	:41	1:20	1:41	2:00	:30	1:00	1:15	1:30	:29	:58	1:00	1:12	:20	:41	:50	1:00	:18	:35	:41	:52
9	1:08	2:15	2:49	3:23	:45	1:30	1:53	2:15	:34	1:08	1:25	1:42	:33	1:05	1:08	1:21	:23	:45	:57	1:08	:20	:39	:48	:58
10	1:15	2:30	3:08	3:45	:50	1:41	2:05	2:30	:38	1:15	1:34	1:53	:36	1:12	1:15	1:30	:26	:50	1:03	1:15	:22	:43	:54	1:05
15	1:53	3:45	4:41	5:38	1:15	2:30	3:08	3:45	:57	1:53	2:21	2:49	:54	1:48	1:53	2:15	:38	1:15	1:34	1:53	:33	1:05	1:21	1:36
20	2:30	5:00	6:15	5:00	1:41	3:20	4:11	5:00	1:15	2:30	3:08	3:45	1:12	2:24	2:30	3:00	:50	1:41	2:05	2:30	:43	1:26	1:48	2:09
25	3:08	6:15	7:49	9:23	2:05	4:11	5:13	6:15	1:34	3:08	3:55	4:42	1:30	3:00	3:08	3:45	1:03	2:05	2:36	3:08	:54	1:48	2:14	2:41
30	3:45	7:30	9:23	11:15	2:30	5:00	6:15	7:30	1:53	3:45	4:42	5:38	1:48	3:36	3:45	4:30	1:15	2:30	3:08	3:45	1:05	2:09	2:41	3:13
40	5:00	10:00	12:30	15:00	3:20	6:41	8:20	10:00	2:30	5:00	6:15	7:30	2:24	4:48	5:00	6:00	1:41	3:20	4:11	5:00	1:26	2:52	3:35	4:18
50	6:15	12:30	15:38	18:45	4:11	8:20	10:26	12:30	3:08	6:15	7:49	9:23	3:00	6:00	6:15	7:30	2:05	4:11	5:13	6:15	1:48	3:35	4:28	5:22

EXTRA TIME ALLOWANCE (EXTAL) TABLE (SINGLE MARCH UNIT)

Number of Vehicles in March Unit	0 to 12	13 to 37	38 to 62	63 to 87	88 to 112	113 to 137	138 to 162	163 to 187	188 to 212	213 to 237	238 to 262
Extal in Minutes	0	1	2	3	4	5	6	7	8	9	10

Time distance. (See fig E-3.) Time distance *does not* include time for long delays or extended scheduled halts. Time distance is determined by dividing distance to be traveled by *rate of march.*

Time distance formula

$$TDIS = \frac{\text{Distance (km)}}{\text{Rate of march (kmih)}}$$

TIME DISTANCE TABLE

Speed Miles/Kilometers per Hour	Rate of March Miles/Kilometers in the Hour	Minutes to Travel 1 Kilometer	Minutes to Travel 1 Mile
10 mph 16 kmph	8 mih 12 kmih	5	7.5
15 mph 24 kmph	12 mih 20 kmih	3	5
20 mph 32 kmph	16 mih 25 kmih	2.4	3.75
25 mph 40 kmph	20 mih 32 kmih	1.84	3
30 mph 48 kmph	25 mih 40 kmih	1.5	2.4
35 mph 56 kmph	30 mih 46 kmih	1.3	2
40 mph 65 kmph	33 mih 53 kmih	1.13	1.8

This table provides the time required to travel 1 kilometer or 1 mile while using specified march speeds. The travel times are calculated based upon rates of march (miles/kilometers in the hour) and include time for scheduled short halts and time lost due to road and traffic conditions. The time for long halts must be added to the total travel time. Multiply the total distance to be traveled (miles or kilometers) by the travel time factor for 1 mile or 1 kilometer for the designated speed.

Figure E-2.

EXAMPLE:

Determine time distance of a serial traveling 135 kilometers at a speed of 24 kmph (rate of march 20 kmih).

$$\text{TDIS} = \frac{135\ (\text{km})}{20\ (\text{kmih})} = 6.75\ \text{hours}$$

TDIS = 6 hours and 45 minutes

$$\begin{array}{r} .75\ (\text{fraction}) \\ \times\ 60\ (1\ \text{hour}) \\ \hline 45.00\ (\text{minutes}) \end{array}$$

Note. Fractional parts of an hour are converted to minutes by multiplying the fraction by 60 and rounding off to the next higher whole minute.

EXAMPLE:

Determine TDIS for a column traveling 310 kilometers at a speed of 24 kmph. Multiply 310 (km) × 3 (min) = 930 minutes. Convert 930 minutes to 15 hours and 30 minutes.

A *time distance table* is a valuable tool for the march planner. It provides a list of factors used to calculate time required to travel certain distances at specified vehicular speeds. Travel rates are expressed in vehicular speeds and corresponding rates of march. Travel factors are derived from rate of march, which includes time for short periodic halts and other minor delays that might occur.

Arrival time. In march planning, the release point usually is designated as the terminal point of movement. Arrival time at the release point is determined by adding time distance and any long scheduled halts to the start point time. It may also be calculated by subtracting pass time from completion time.

EXAMPLE:

Determine arrival time for a serial with a start point time of 0800 hours, time distance of 6 hours and 45 minutes, and a scheduled halt of 1 hour.

	Hours	Minutes
SP time	08	00
Time distance	6	45
Scheduled halt	1	00
	15	45

Arrival time is 1545 hours.

Completion time. Completion is calculated by adding pass time to arrival time. Completion time may also be determined by adding start point time, time distance, pass time, and any long or scheduled halts.

EXAMPLE 1.

Determine completion time for a serial with an arrival time of 1545 hours and a pass time of 41 minutes.

	Hours	Minutes
Arrival time	15	45
Pass time		41
	15	86

Completion time is 1626 hours.

Note. Convert 86 minutes to 1 hour and 26 minutes, then add it to 1500 hours.

EXAMPLE 2.

Determine completion time for a serial with a start point time of 0800 hours, time distance of 6 hours and 45 minutes, a pass time of 41 minutes, and a scheduled halt of 1 hour.

	Hours	Minutes
SP time	08	00
Time distance	6	45
Pass time		41
Scheduled halt	1	00
	15	86

Completion time is 1626 hours.

Movement order.

A movement order is a type of operation order. It contains instructions for movement of units from one location to another within a stated time. Preparation of the order usually follows reconnaissance.

Information in the movement order includes the situation of friendly and enemy forces, destination, routes, rate of march, maximum speeds, order of march, start point, start point times, details of air and ground alert guards, scheduled halts, vehicle distances, time gaps, release point, critical points, service support, communications, location of the commander during the march, and strip maps. Other details included, as necessary, are route or unit markers to be used, control points or checkpoints, and location of road guides. Certain items listed above often become standard, and units include them in standing operating procedures. Repetition of these items is not necessary in the order.

A *strip map* is a sketch of the route of march and usually is included as an annex to the movement order. Strip maps should be reproduced in sufficient quantities that they may be given to key personnel, including vehicle commanders and route guides. The amount of detail depends upon the intended purpose of the strip map and the unit level at which it is prepared. A strip map should contain the start point and release point, restrictions, and critical points and distances between them. An example strip map is shown in figure E-3.

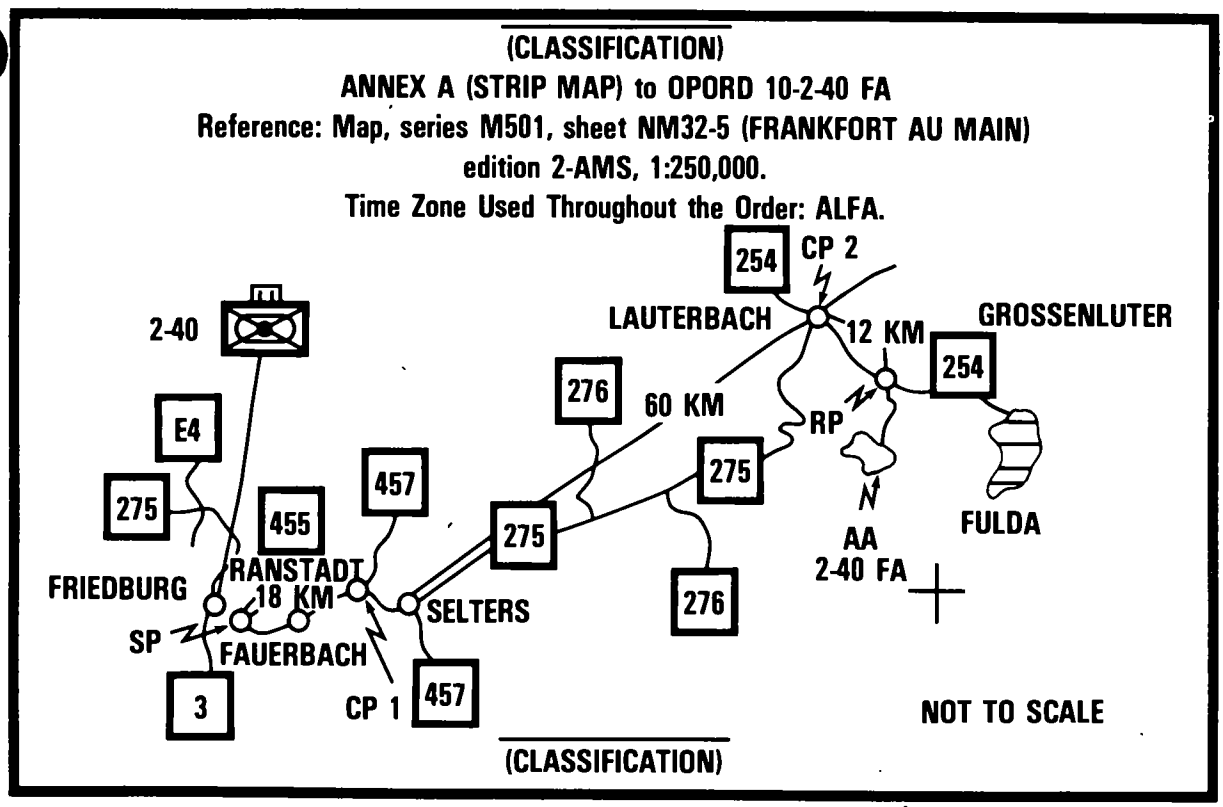


Figure E-3.

Road movement graph.

A road movement graph is a time space diagram that visually depicts a movement from start point to release point. It may be used during movement planning stages to avoid conflicts and discrepencies and prevent congestion along the route of march. It may also be used to prepare and check the road movement table. It shows the relative time and location of the head and tail of each march element at any point along the route, arrival and clearance times of march elements at critical points, and restrictions, pass times, time distance, and rate of march. Preparation of a road movement graph is not mandatory; however, it is of great value to the planner simply because it reduces mathematical calculations that would ordinarily be required to prepare march schedules.

Information derived from march formulas or obtained from march tables is transferred directly to the graph. To complete the road movement graph, the planner must have already organized the march column into serials or serials into march units; determined time distance, arrival time, and completion time; and computed pass times for each serial or march unit as appropriate. (See fig E-4.)

TIME DISTANCE DIAGRAM

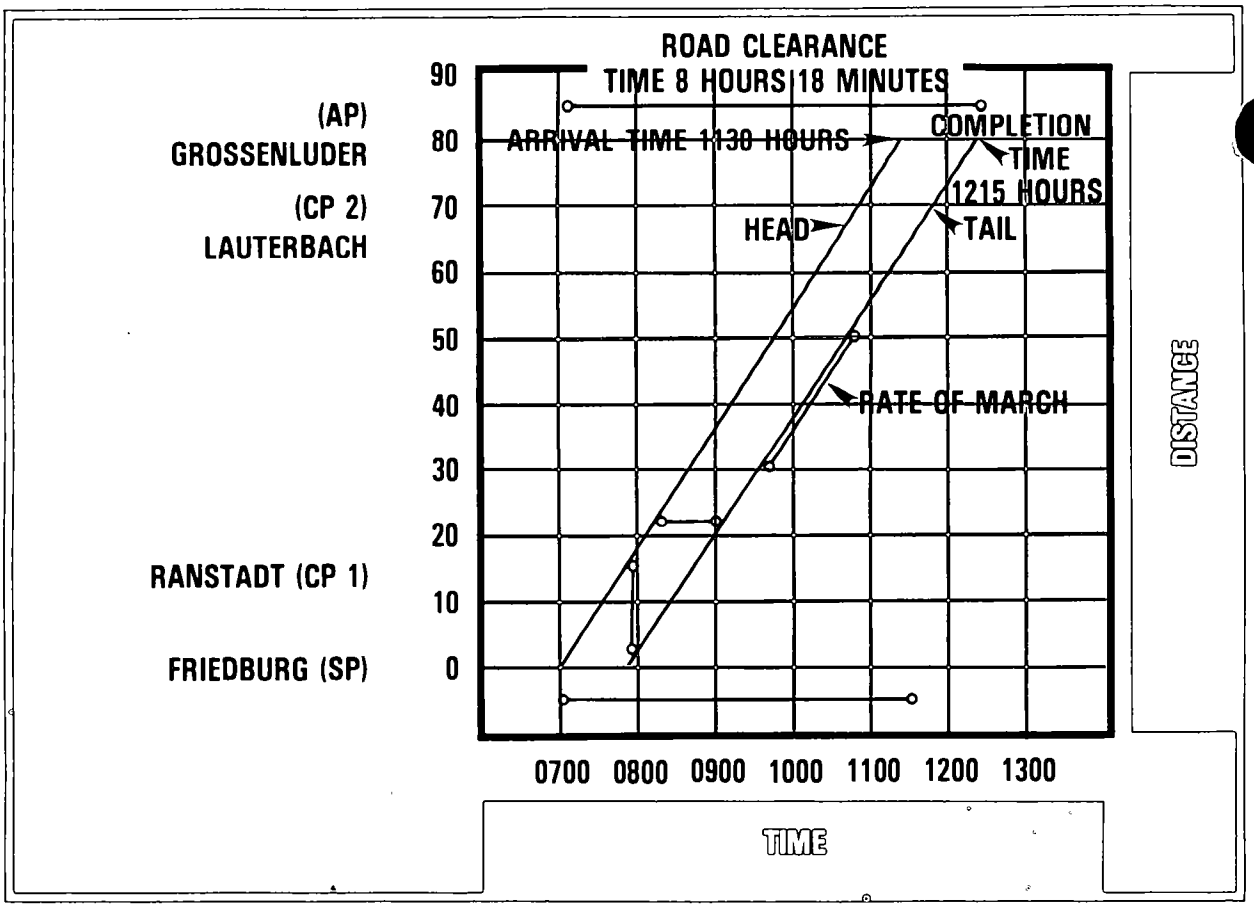


Figure E-4.

Road movement table.

Normally, a road movement table is an annex to a movement order. It is a convenient means of transmitting time schedules and other essential details of the move to subordinate units. It is particularly useful when the inclusion of such details in the body of the operation order would tend to make the order complicated or unduly long. Road movement tables consist of two parts:

- **Data paragraphs reflecting general information common to two or more march elements, a list of serials or march units, and all other necessary information arranged in tabular form.**
- **Data that has been transferred to the road movement table from the road movement graph. Of particular importance to the march planner are the times at which serials or march units arrive at and clear critical points.**

Other information included on the road movement table is serial or march unit number, date of move, units involved, number of vehicles, load class of heaviest vehicle, routes to be used, and (in a "remarks" section) any details not covered elsewhere. (See fig E-5.)

Figure E-5.

ROAD MOVEMENT TABLE-EXAMPLE OF ANNEX TO ARMOR BATTALION OPERATION ORDER

(A guide only; modification or adjustment is necessary to suit specific cases)

(CLASSIFICATION)

ANNEX B (ROAD MOVEMENT TABLE) to OPORD 10-2-10 Armor
Reference: Map, series M501, sheet NM32-5 (FRANKFURT AM MAIN), edition 2-AMS, 1:250,000.
Time Zone Used Throughout the Order: ALFA.

General Data:
1. Speed: 24 kmph.
2. Rate of March: 20 kmh
3. Open Column.
4. Traffic Density: 15 VPK.
5. Time Gaps: 2 minutes between MU.
6. Halts. SOP
7. Route: Annex A, Strip Map.
8. From: FRIEDBURG MA812610.
9. TO: KLEINLUDER NB395005.
10. Critical Points:
    a. Start Point: RJ 275 at MA839754 (FAUERBACH).
    b. Release Point: RJ 254 at NB383038 (GROSSENLUDER).
    c. Other Critical Points:
       (1) RJ 457 and 275 at MA989780 (RANSTADT).
       (2) RJ 275 and 254 at NB278102 (LAUTERBACH).
    d. Route Classification: 6 m s 60.
11. Main Routes to SP: Hy 3 to HY 275.
12. Main Routes from RP: Unnumbered secondary route.

March Unit No.	Date	Unit	No. of Veh	Load Class Hv Veh	From	To	Route	Route to SP	Critical Points Raf	Due (hr)	Clear (hr)	Route from RP	Remarks
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)
Dtr Party	4 Aug	S1, Comm Plt, HHK KD, BC A, B, C	7	14	(8 above)	(9 above)	Strip map	(11 above)				(12 above)	Move by infiltration.
Recon Party	4 Aug	Recon Party	10	11	(8 above)	(9 above)	Strip map	(11 above)				(12 above)	Move by infiltration.
MU 1	4 Aug	Btry A	25	50	(8 above)	(9 above)	Strip map	(11 above)	SP CP 1 CP 2 RP	0700 0751 1048 1130	0706 0757 1054 1136	(12 above)	Det. 1¼-ton qtr pty, sup trk to bn tns. Atch: PST: 6 minutes.
MU 2	4 Aug	HHC (-)	21	50	(8 above)	(9 above)	Strip map	(11 above)	SP CP 1 CP 2 RP	0708 0759 1056 1138	0713 0804 1101 1143	(12 above)	Det: 2½ ton and 1-1¼-ton qtr pty Atch: PST: 5 minutes
MU 3	4 Aug	Btry B	25	50	(8 above)	(9 above)	Strip map	(11 above)	SP CP 1 CP 2 RP	0715 0806 1103 1145	0721 0812 1109 1141	(12 above)	Det: 1¼-ton qtr pty, sup trk to bn tns. Atch: 1 PST: 6 minutes.
MU 4	4 Aug	Ammo Plt	26	57	(8 above)	(9 above)	Strip map	(11 above)	SP CP 1 CP 2 RP	0723 0814 1111 1153	0729 0820 1117 1159	(12 above)	Det: Atch: PST: 6 minutes
MU 5	4 Aug	Bn Tns	20	15	(8 above)	(9 above)	Strip map	(11 above)	SP CP 1 CP 2 RP	0731 0822 1119 1201	0736 0827 1124 1206	(12 above)	Det: 6 Cl III trks, 4 aid/evac vehs. Atch. 3 co sup trks PST: 5 minutes.
MU 6	4 Aug	Btry C	25	50	(8 above)	(9 above)	Strip map	(11 above)	SP CP 1 CP 2 RP	0738 0829 1126 1208	0744 0835 1132 1214	(12 above)	Det: 1¼-ton qtr pty, sup trk to bn tns. PST: 6 minutes.
Trail Party	4 Aug	Maint Plt	11	55	(8 above)	(9 above)	Strip map	(11 above)				(12 above)	Move by infiltration Atch. 1 Cl III trk, 1 aid/evac veh

(CLASSIFICATION)

Notes.

1. Only the minimum number of headings above should be used. Any information common to two or more movement numbers should be included under General Data paragraphs. (Columns (f), (g), (h), (i), and (m) could have been omitted in this example.)
2. Since the table may be issued to personnel concerned with control of traffic, the security aspect must be remembered. It may not be desirable to include dates or locations.
3. If the table is issued by itself and not as an annex to a more detailed order, the table must be signed or authenticated in the normal way.
4. Critical point is defined as "a selected point along a route used for reference in giving instructions." It includes start points, release points, and other points along a route where interference with movement may occur or where timings are critical.
5. The movement number (column (a)) identifies a column (or element of column) during the whole of the movement.
6. If an annex has the same distribution as an operation order, it is not necessary to include the headings shown in this example.
7. To obtain due times for MU1, transfer directly from road movement graph or calculate using time distance table and strip map.
8. To obtain clear times, add MU pass time to due time.
9. To complete the schedule for successive march units, add pass time plus time gap to due time. (Example: PST of MU1, which is 6 minutes, plus time gap between MU, which is 2 minutes, equals 8 minutes. Add the 8 minutes to the 0700 SP due time of MU1 to obtain the SP due time for MU2, which is 0708.)

APPENDIX F:

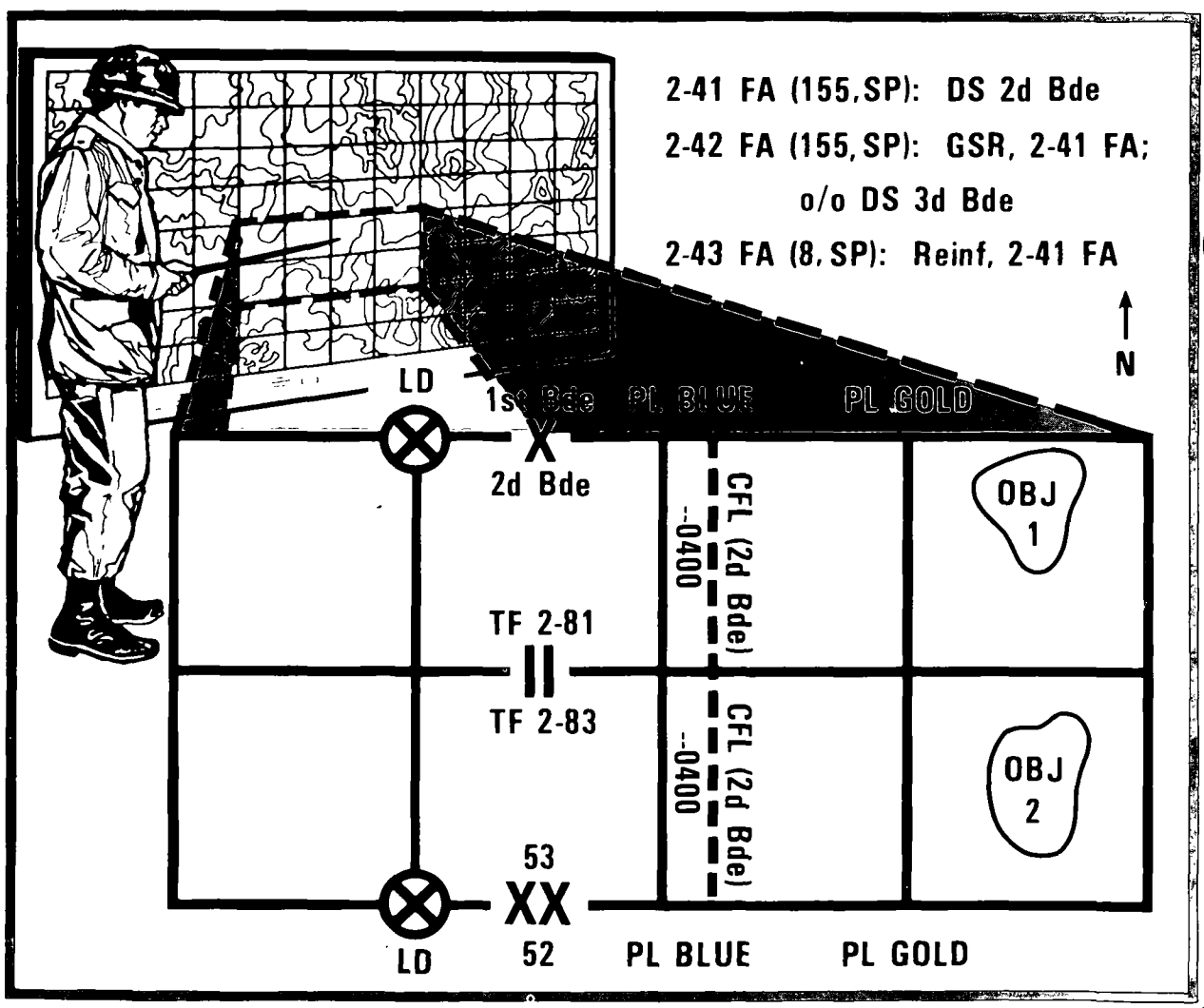
Tactical Scenarios

The following scenarios are designed as a vehicle to discuss field artillery cannon battalion level command and staff functions in support of offensive and defensive operations. Situations and solutions are not unique and are intended only to allow application of "how to" principles and illustrate considerations. The scenarios address almost exclusively field artillery cannon battalions performing the tactical missions of direct support and reinforcing since they are the missions that are the most demanding *and* the most responsive to the needs of committed maneuver forces. Battalions with the tactical missions of general support reinforcing and general support are most responsive to the force artillery headquarters, and their fires are employed primarily in support of the entire force rather than to a committed element of the force. Met/survey/registration, reconnaissance, movement, and combat service support considerations discussed in these scenarios for DS and reinforcing battalions have equal applicability to GSR and GS battalions. Any cannon battalion can be assigned a DS mission. (See appendix C for necessary radio augmentation.) Consequently, material in the scenarios that specifically addresses the DS mission is applicable to *all* field artillery cannon battalions.

Movement to Contact Scenario

Situation.

The 2d Bde, 53d Mech Div, is deployed in the southern portion of the division sector with the mission to attack to secure objectives in zone and be prepared to continue the attack. The 2d Bn (155, SP), 41st FA, is DS to 2d Bde. 2d Bde is currently not in contact with enemy forces and the brigade commander has directed TF 2-81 and TF 2-83 to conduct a movement to contact; on order, be prepared to attack to secure objectives in zone. The situation overlay is shown below.



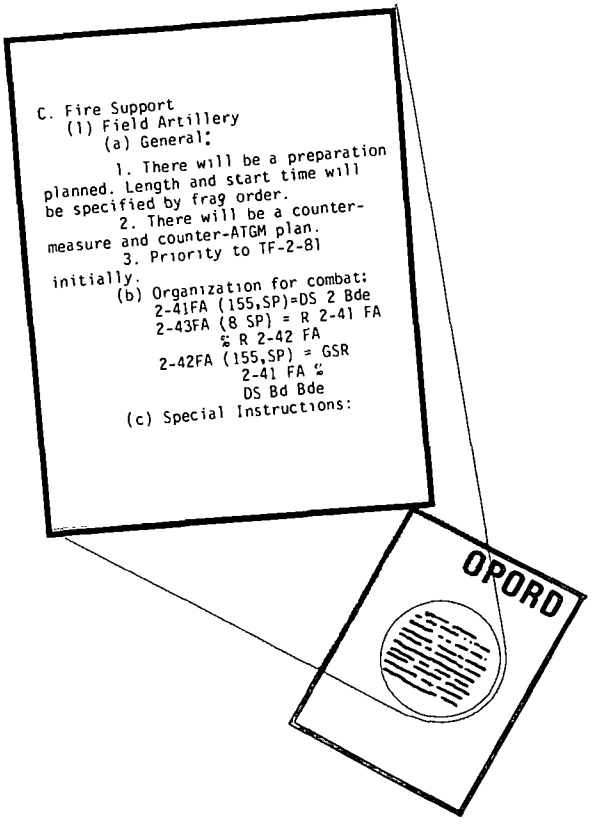
As the 2d Bde commander develops his plan for the employment of maneuver forces for the movement to contact, he must visualize how his fire support will be used. The DS battalion commander, as FSCOORD for the brigade, and the brigade FSO, participate actively in the planning stages of the operation by providing fire support considerations for the maneuver commander's estimates, decisions, and concepts. (FM 6-20, chapter 3 and appendix I, contain detailed information on how the FSCOORD interacts with the brigade commander and his staff during the planning stages of an operation.)

As part of his concept of the operation and based on recommendations from the FSCOORD, the brigade commander issues his concept of fire support:

"I want suppressive fires planned during the movement to contact. Priority of fires will be to TF 2-81 initially. I'm concerned about the enemy's counterfire and ATGM capability, so plan fires to counteract these threats. I'm also concerned about the enemy's capability to reinforce in our zone. As targeting information develops, I want fires planned on known or suspected reserve locations and on obvious reinforcement routes. Both of my lead task force commanders have requested dedicated battery support for the movement to contact. FSCOORD, get back to me with a recommendation on dedicated battery support."

This concept drives the preparation of the brigade fire support plan.

The brigade fire support officer, working with the brigade staff and other fire support representatives in the brigade fire support element, develops the fire support plan that outlines how available fire support will be employed to support the scheme of maneuver. The first subparagraph of the fire support plan addresses the employment of field artillery support. The FSO does not wait until the fire support plan is written, but immediately passes the *known* information to the 2-41 FA (DS 2d Bde) so that the battalion can begin its fire planning effort.



Field artillery organization for combat.

As part of the initial planning effort, the DS battalion commander (2-41 FA) and his S3 must analyze the field artillery organization for combat and the resulting implications:

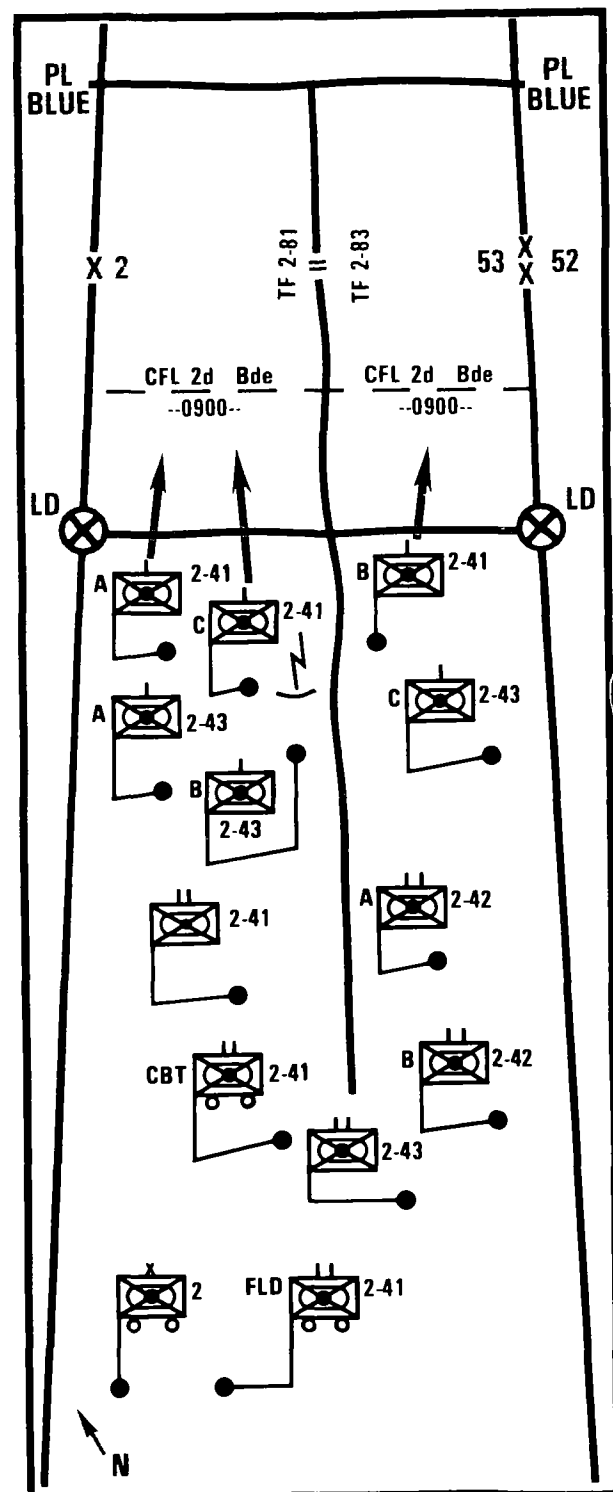
- **2-43 FA (8, SP) is reinforcing 2-41 FA. 2-41 FA has first priority on its fires as well as positioning and fire planning authority.**
- **2-42 FA (155, SP) is general support reinforcing 2-41 FA, on order DS 3d Bde. 2-41 FA has second priority on its fires.**
- **Preparations should be made to receive liaison officers from 2-42 FA and 2-43 FA.**
- **The three batteries of 2-43 FA (reinf) should be included in the field artillery fire planning effort, giving 2-41 FA (DS) a total of six batteries for which it can plan fires.**
- **2-43 FA (reinf) should be an addressee for all plans and orders published by 2-41 FA (DS). 2-42 FA (GSR) should also be included as an "information" addressee.**

Positioning considerations.

Early in the planning stages of the operation, the S3, 2-41 FA (DS), selects initial positions to support the movement to contact and possible attack. In selecting these positions, he should—

- **Select position areas as far forward as practical to exploit the range of the weapons, to facilitate liaison and communications with FISTs and FSOs, and to reduce the number of displacements required as the brigade advances.**

POSITIONING



- **Select position areas in the zone of the brigade and coordinate with the brigade to avoid interference with maneuver units.**
- **Choose position areas from which batteries can displace forward easily. Also, in positioning the 2-41 FA (DS) and 2-43 FA (reinf), the S3 must determine how he intends the battalions to move to support the brigade's movement to contact/attack.**
- **Place service or trains elements as far forward as possible for responsive support of the firing batteries.**
- **Give priority of field artillery positions to 2-41 FA (DS) and 2-43 FA (reinf) in that order. If division artillery positions elements of 2-42 FA (GSR) in 2d Bde zone, they will have third priority.**

Employment of target acquisition.

2-41 FA (DS) has one weapon locating radar attached from the division artillery target acquisition battery. The battalion S2 has recommended a general location for the radar and the S3 has agreed. The radar section chief will select the exact site. The S2 will orient the radar and assign sectors of scan and cuing instructions, based on current combat intelligence of enemy dispositions. As the situation develops, sectors of scan for the radar will be modified based on reports of enemy firing received from FSO and FIST personnel. The initial position selected for the radar is near the center of the brigade zone to provide maximum coverage. The closest firing element is C/2-41 FA (DS), and the S3 coordinates with the battery commander to insure that the radar is tied into the battery's perimeter. As part of the survey effort for the battery position, the survey section will extend control to the radar site.

Two FAAOs have been designated by division artillery to work in the 2d Bde zone under control of 2-41 FA (DS). The S2 can plan FAAO missions to fill the areas where FISTs cannot observe due to terrain masks. In addition to the increased observed fire capability that the FAAOs will provide, the S2 considers them as a significant target acquisition capability and will brief them prior to each mission regarding:

- **Nets and call signs to be used.**
- **Field artillery available in range of the area in which the FAAO will be operating.**
- **Known or suspected enemy forward air defense locations in that area.**
- **Any specific information desired from the area.**

The S2, 2-41 FA (DS), works closely with the S2, 2d Bde, to insure that target acquisition resources controlled by 2-41 FA (DS) are integrated effectively into the overall intelligence collection plan of the brigade. The brigade S2 has established the following as initial target acquisition priorities:

- **ATGM and ATG**
- **Artillery and mortars**
- **Reserves**
- **Air defense weapons**

The S2, 2-41 FA (DS), insures that these priorities are disseminated to all target acquisition means controlled by the battalion. (Normally, FISTs and FSOs receive these priorities through maneuver channels.)

Dedicated batteries.

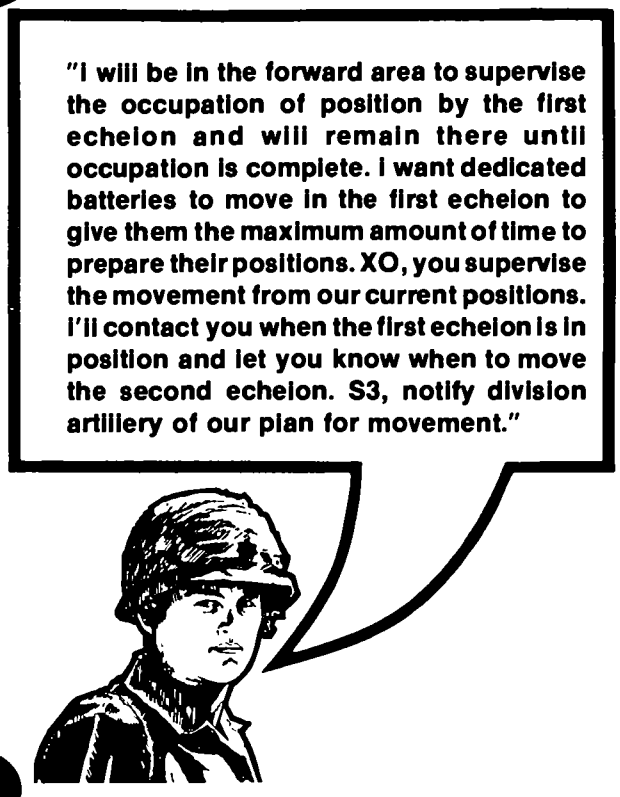
The battalion commander, 2-41 FA (DS), and his S3 discuss the brigade commander's request for a recommendation on whether or not to dedicate batteries during the movement to contact. Each favors dedication primarily because the enemy situation is vague and information regarding enemy strengths and dispositions within the brigade zone gives no indication as to where initial contact can be expected. The need for dedication is reinforced by the fact that the reinforcing fires of 2-43 FA make it possible to dedicate two batteries and still have field artillery immediately responsive to the fire support needs of the total force. The battalion commander therefore recommends to the brigade commander that two batteries be dedicated during the movement to contact. (FM 6-20, chapter 4, illustrates the decisionmaking process the brigade commander and DS battalion commander must go through in considering dedication.) The brigade commander directs that a battery be dedicated in the zone of each lead task force. The commander, TF 2-81, designates Team A, and the commander, TF 2-83, designates Team B as the company team to receive dedicated support. The commander, 2-41 FA, designates A/2-41 FA and B/2-41 FA as the dedicated batteries, since the positions that have been selected for these batteries are well forward and in the zone of TF 2-81 and TF 2-83, respectively. The brigade FSO notifies the battalion FSOs of the dedication, and they in turn notify the FISTs with Team A, TF 2-81, and Team B, TF 2-83. The brigade S3 has sent a frag order to the task forces notifying them of the approved dedication. The S3, 2-41 FA, alerts these battery commanders to be prepared for dedicated status. He also contacts the brigade FSO instructing him to check on the availability of engineer support to assist in hardening the positions. The S3 insures that personnel within the battalion operations/FDC understand that—

- **F1 and F3 will be the dedicated fire nets. The operations/FDC will *monitor* only.**
- **The battalion will not plan fires for the dedicated batteries as long as dedication is in effect.**
- ***No* fire missions will be sent to the dedicated batteries from battalion until dedication is terminated.**
- **Data will be computed on all targets planned to support the lead company team to facilitate rapid augmentation of the dedicated battery fires.**

The S3 notifies the S4 of the pending dedicated status with instructions to respond quickly to class V requirements for those batteries and to provide all possible assistance in hardening the battery positions.

Displacement.

The S3, 2-41 FA (DS), recommends that both 2-41 FA and 2-43 FA (reinf) displace by echelon to the initial positions selected to support the movement to contact. The battalion commander issues the following instructions to his XO and S3:



In this situation, the commander decided to move by echelon. He did not elect to move by battery or battalion for the following reasons:

- ☐ Movement by battalion places the total firepower of a field artillery battalion on the road at the same time. If *speed* had been the overriding consideration in this displacement forward, the "battalion" method of displacement could have been selected. 2-41 FA (DS) would have displaced first and 2-43 FA (reinf) would have established communications with, and answered calls for fire from, FISTs/FSOs until 2-41 FA was in position. 2-43 FA would have displaced forward on order of 2-41 FA *after* 2-41 FA was in position and had reestablished communications with FISTs/FSOs.
- ☐ Movement by battery requires the greatest amount of displacement time. If the overriding consideration during displacement had been maximum field artillery in position to provide continuous support, the "battery" method of displacement could have been selected. Displacement by battery as opposed to displacement by battalion or echelon is a tradeoff between speed and responsiveness. Since the brigade was not then in contact, movement by battery was not a good choice.

Registration.

The S3/FDO has a number of registration options available. In this situation, he decides not to register, but to shoot met + VE instead. (FM 6-40, chapter 5, discusses other registration options.) He bases this decision on the following considerations:

- **Registration might compromise the operation.**
- **Survey will be provided to all fire units (location and directional control) in the initial positions.**
- **Current met data is available from the division artillery met station located approximately 6 kilometers to the rear of the firing battery locations.**
- **The battalion has calibrated recently and muzzle velocities are relatively current.**

Immediate action status.

The S3 recommends "move to alternate position" as the immediate action status for 2-41 FA (DS) (except for dedicated batteries) and 2-43 FA (reinf) during the movement to contact. He makes this recommendation based on the following considerations:

- **Reinforcing field artillery (2-43 FA) is available to continue fire support if a battery is required to move to its alternate position to avoid losses due to enemy incoming artillery.**
- **Frequent moves are anticipated; therefore, the time available to harden positions will be limited and protection for personnel will not be fully developed.**
- **The enemy is defending. His logistics problems are minimized and there is nothing to indicate that he is experiencing shortages of class V. It can be assumed that if he locates our positions, he has the capability to place a heavy volume of fire on them.**

The immediate action status of "move to alternate position" is transmitted to all elements of 2-41 FA (DS). This authorizes battery commanders to displace under fire on their own initiative. The liaison officer, 2-43 FA (reinf), passes the immediate action status to his battalion. (FM 6-50 contains additional information pertinent to "immediate action.")

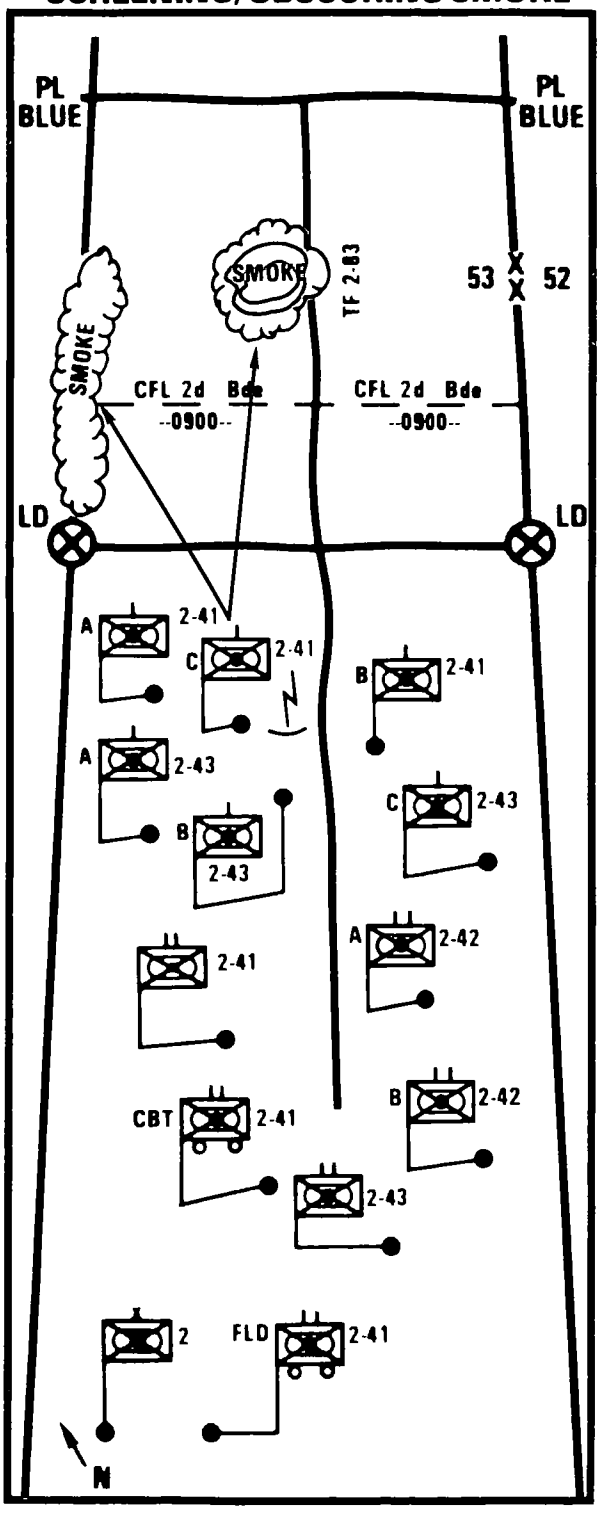
Crossing the LD.

At H-hour, company teams from TF 2-81 and TF 2-83 move across the line of departure. 2-41 FA (DS) and 2-43 FA (reinf) have displaced forward and are laid and ready to fire. A/2-41 FA and B/2-41 FA are in position, have received and processed planned targets along the route of the movement to contact, and are prepared to provide *dedicated* support to Team A, TF 2-81, and Team B, TF 2-83. Division artillery has displaced 2-42 FA (GSR) forward and two of its batteries are positioned in 2d Bde's zone and can range the movement route. These positions have been coordinated with and approved by 2d Bde. The dedicated batteries will suppress isolated security elements that could degrade forward momentum. After the lead company teams have passed these elements, 2-41 FA (DS) will pick up the mission from the dedicated batteries. Suppression fires will continue for as long as the target constitutes a threat to the brigade's movement. When FISTs call for fire, the 2-41 FA battalion FDC monitors the call and transmits target location and target description to field artillery units it controls that are in range. This transmission is conducted on a net other than the dedicated net or by wire if available. The designated units compute data for the target and stand by to fire on command of the FDO, 2-41 FA (DS). If the fires of the dedicated battery are sufficient, no further action is taken. If the FIST ends the suppression mission (the company team has passed the enemy element) and the target still requires suppression, he will request 2-41 FA (DS) FDC to engage the target.

Screening/obscuring smoke planned to support a lead company team.

TF 2-81 and TF 2-83 have moved forward from the line of departure with no significant contact. Team A, TF 2-81, has

SCREENING/OBSCURING SMOKE



been moving over broken terrain that provides little natural concealment. The FIST chief with Team A had anticipated this problem and planned smoke to screen the company team's movement. He also requested that obscuring smoke be planned on high ground overlooking one of the company team's planned overwatch positions.

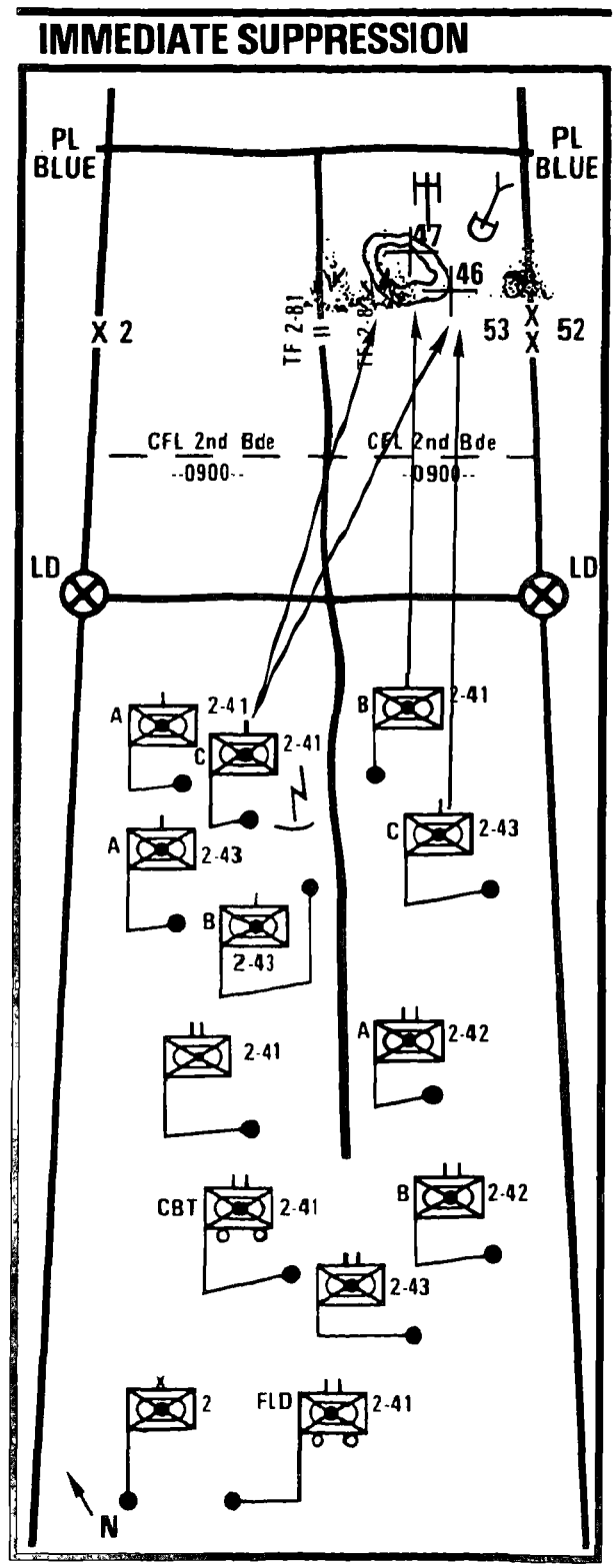
The FIST chief further requested that the DS battalion FDC provide the screening and obscuring smoke so that the dedicated battery (A/2-41 FA) could remain laid and ready to fire on planned suppressive targets in the company team's zone. The S3 directed that the mission be given to C/2-41 FA. The FIST is controlling the screening smoke and the S3 has directed one of the FAAOs to control the obscuring smoke. The FIST will terminate both missions when the smoke is no longer necessary.

- The situation above illustrates a way in which dedicated battery fires can be augmented. The FIST has preplanned priority suppressive targets in support of the company team's movement and has a platoon from the dedicated battery laid and ready to fire on each of these targets (three targets at any one time). As the company team advances, targets that are bypassed are canceled and the platoons lay on the next priority suppressive targets designated by the FIST. By using other than dedicated battery fires for the screening/obscuring smoke, the S3 is able to keep the dedicated battery oriented on the planned priority suppressive targets, ready to suppress *immediately* should the need arise.

Immediate suppression mission.

Shortly after the smoke mission is completed, first contact is made by Team B, TF 2-83. The FIST's fire request, IMMEDIATE SUPPRESSION—TARGETS 46 AND 47, comes over the dedicated net, and B/2-41 FA responds with immediate suppressive fires on the planned targets. The DS battalion FDO looks at the plot of the target in relation to the fire unit locations and sees that C/2-43 (reinf) and C/2-41 (DS) can both engage targets 46 and 47. He determines from monitoring the dedicated net that the company team is receiving ATG and ATGM fire from both locations. All targets on the target lists submitted by the FISTs with the lead company teams were transmitted to all firing units in range with instructions to keep firing data current for these targets. The liaison officer from 2-43 FA (reinf) alerts his battalion to have Battery C come up on the DS battalion CF1 net for a fire mission. The DS battalion FDO contacts C/2-41 (DS) on the DS battalion CF1 net and directs the battery to lay on target 46. C/2-43 FA comes up on the CF1 net and is also directed to lay on target 46. The dedicated battery's fires suppress the enemy positions effectively, and the FIST requests 2-41 FA (DS) to neutralize the targets. 2-41 FA FDO fires two batteries, one volley (HE/VT and PD) on target 46 using C/2-41 FA and C/2-43 FA, then repeats the method of fire on target 47 using the same two batteries.

- The FDO used the information in Joint Munitions Effectiveness Manuals and Graphical Munitions Effects Tables to assist him in



making this decision. The FDO could also use the optimum shell/fuze combination and target matrix as "a way" to help make rapid and realistic "method of engagement" decisions.

Communications.

The only radio nets in use thus far in the movement to contact are the two dedicated fire nets and the DS battalion CF1 net. The dedicated nets are used by the FISTs with the dedicated batteries and their transmissions are as brief as possible to avoid detection. The DS battalion has not yet opened its CF2 or its third fire direction net and *will not* do so until necessary radio traffic exceeds the capability of the nets in use. The previous fire mission to the reinforcing battalion was transmitted over wire that was laid between the DS and reinforcing artillery. The DS battalion FDC is the net control station for the command fire and fire nets and should keep the nets "policed" of long and unimportant traffic, and open nets selectively as the need for radio traffic increases.

Purging targets.

The movement to contact continues with lead company teams making good progress. As planned suppressive targets are passed, the DS battalion purges these targets from the target list and replaces them with new priority suppressive targets submitted by the FISTs. Each new target is passed immediately to other fire units of 2-41 FA (DS) and 2-43 FA (reinf) within range as on-call targets. The fire units will maintain current firing data for these targets and be ready to respond with additional fires to the lead company teams as needed.

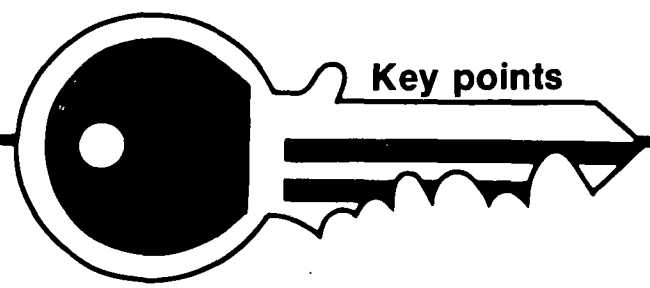
Field artillery fires for company teams that do not have dedicated field artillery support.

The FISTs with company teams that do not have dedicated support have also planned suppressive and screening (smoke) fires for the movement to contact. These targets have been passed through battalion FSOs to 2-41 FA (DS) FDC. The FDO assigns the suppressive targets to the 2-43 FA (reinf) and the smoke targets to C/2-41 FA as on-call targets. The S3 directs that the batteries assigned the targets monitor the appropriate fire net so that the FISTs can call directly to the battery for the planned suppressive fires. The FSO insures that the FISTs know which battery will fire their suppressive targets *and* which batteries are 8-inch. C/2-41 FA (DS) cannot cover all of the planned smoke targets, so the FSO assigns these targets not covered by the battery to the maneuver battalion mortars.

Hasty attacks as part of a movement to contact.

As the movement to contact continues, enemy resistance increases in both task force zones. TF 2-81 reports contact with a reinforced enemy platoon and the task force commander has launched a hasty attack to overcome the enemy force and further develop the situation. (FM 71-2,

chapter 4, contains a detailed explanation of hasty attacks.) The hasty attack is launched without hesitation as an extension of the movement to contact. The FISTs with Teams A and B (Teams A and B will conduct the attack), TF 2-81, develop hasty fire plans consisting of on-call suppressive fires and screening smoke to support the TF commander's scheme of maneuver. To increase responsiveness, the FDO, 2-41 FA, instructs the FIST chiefs with Teams A and B to transmit their on-call targets directly to A/2-41 FA and B/2-41 FA, respectively. 2-41 FA FDC monitors these transmissions and records the target descriptions and locations. The FSO with TF 2-81 has also submitted on-call targets planned on suspected enemy overwatch positions. The FDO passes these targets to 2-43 FA (reinf) to be fired by A/2-43. A/2-43 FA is directed to enter and monitor the FSO fire net to insure rapid response when these targets are called for. As TF 2-81 closes with and overruns the enemy position, field artillery fires are shifted to targets that have been planned by the FSO while the hasty attack was in progress. These targets consist of likely enemy assembly areas, chokepoints, and counterattack routes. As a result of the decisive, rapid actions taken by fire and maneuver elements in this situation, the hasty attack is successful, and TF 2-81 continues the movement to contact to further develop the situation.



Key points

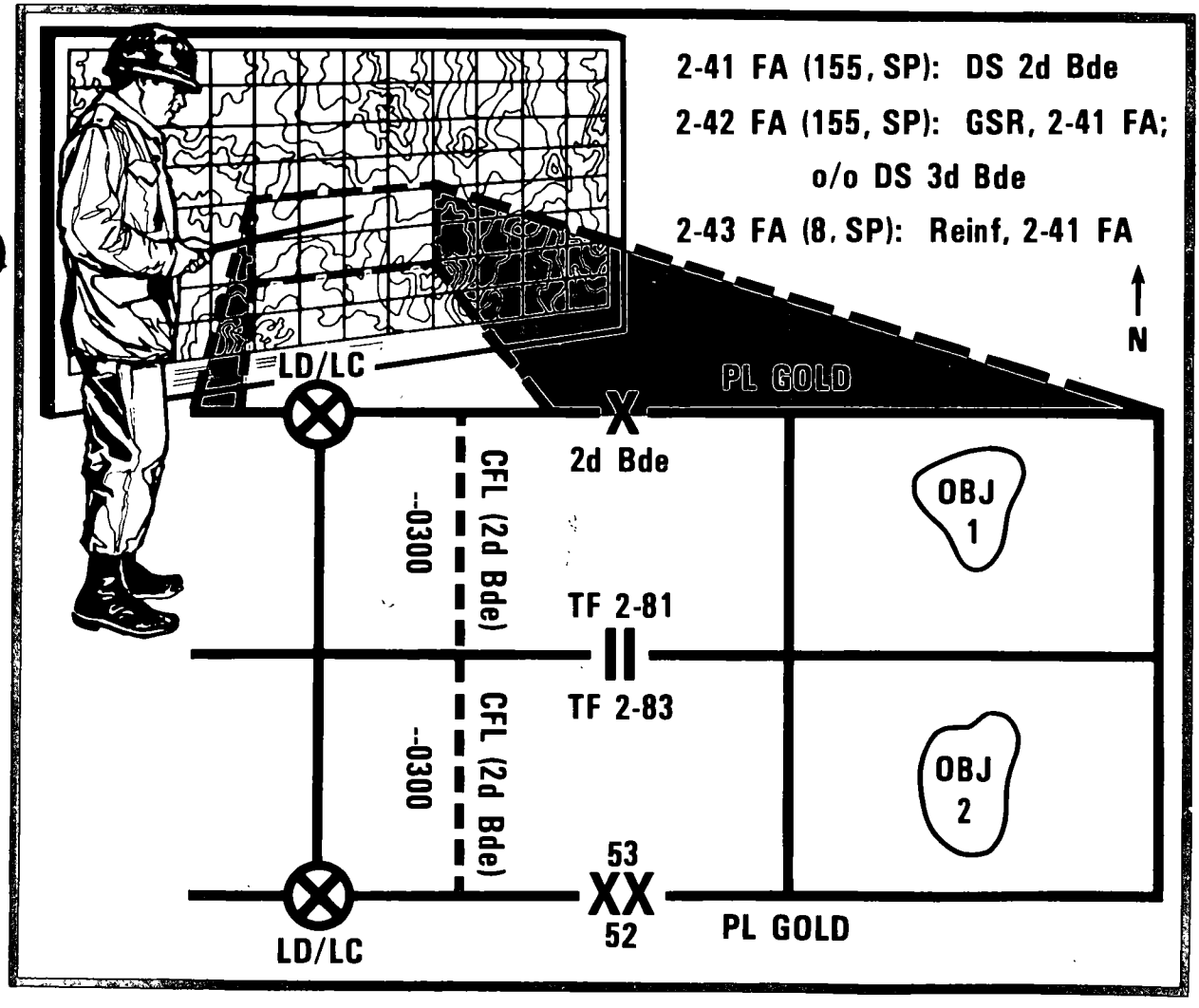
In the movement to contact, field artillery tasks are accomplished by providing:

- **Immediately responsive dedicated battery support to lead company teams.**
- **Smoke to screen friendly movement.**
- **Priority suppressive targets planned and fired in support of lead company teams.**
- **Suppressive targets that were shifted forward as lead company teams advanced.**
- **Fires in support of company teams that did not have dedicated support.**
- **Fires to support hasty attacks.**

Deliberate Attack Scenario

Situation continued.

The 2d Bde is conducting a deliberate attack. Field artillery organization for combat and the brigade operation overlay follow:



The commander, 2-41 FA, has returned to his CP after a conference with the brigade commander and other members of the brigade staff. He assembles his staff and issues the following guidance:

"Enemy forces have occupied defensive positions along a line 4-6 km forward of the lead company team's current location and are attempting to reinforce in this area by moving forces forward. S2, contact the brigade S2. He has some new intelligence regarding possible enemy reserve locations and movement routes from those locations to the defensive line.

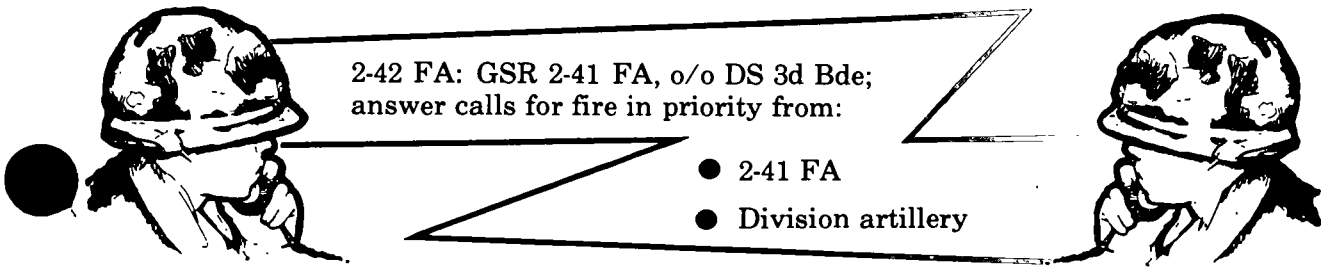
"S3, call division artillery and request that they give us first priority on the fires of 2-42 FA (GSR), so we can use them against the enemy's reinforcing effort and still have our battalion and 2-43 FA (reinf) to support the attack.

"The brigade commander wants a 15-minute prep fired at H-5 to support the attack, so make sure it's ready to go with a current met. The brigade commander expects the situation to move rapidly, so we need to be planning for a move forward in time to support the assault and consolidation on objectives 1 and 2. The two lead task forces, TF 2-81 and TF 2-83, will make the attack. Target lists are being prepared by battalion and brigade FSOs to support the attack and we should be receiving them shortly.

"S2, the brigade S2 wants target acquisition means oriented on locating the enemy's forward defensive positions, indirect fire systems, command control elements, and reserves. FISTs and FSOs have this information through maneuver channels. Make sure our batteries, WLRs, and FAAOs get the word."

Note. If the division were being passed through a stationary force to conduct a deliberate attack, the considerations listed in chapter 2 for a forward passage would apply.

Disrupting the enemy's efforts to reinforce his defensive area is critical to the success of the attack and is the basis for requesting first priority on the fires of 2-42 FA (GSR). The request, if approved, will allow 2-41 FA (DS) and 2-43 FA (reinf) to handle immediate close support fire requests from attacking elements while 2-42 FA places effective fires on deep targets to impede the enemy's efforts to reinforce. Division approves the request, and transmits a frag order to 2d Bde, 2-41 FA, 2-42 FA, and division artillery. The frag order contains the following nonstandard mission for 2-42 FA:



This nonstandard mission modifies the priority in which 2-42 FA would answer calls for fire under the tactical mission of GSR. Nothing else has been modified or changed, so the DS battalion S3 cannot position 2-42 FA or plan their fires. He also should be aware that 2-42 FA still has the on-order mission of DS 3d Bde.

Now that the enemy's initial line of defense has been identified, the number of targets for inclusion in the prep from FISTs and FSOs will increase significantly. Some of the "suspected" targets planned earlier will be purged as the situation develops and more reliable targets are acquired.

At some point prior to execution (10-15 minutes), the prep schedule must be completed. This will allow fire units time to compute data on the last targets received and also allow time for battalion operations/FDC personnel to make any last minute adjustments or refinements to the prep schedule. (FM 6-20, appendix H, contains detailed procedures for planning preparation fires.)

The attack begins and lead elements of TF 2-81 come under heavy fire immediately. The FIST chief with Company A, TF 2-81, calls a fire mission on an ATG position firing on the lead platoon. At the same time, the FIST chief with Company B, TF 2-83, calls a fire mission on an estimated enemy platoon of BMPs moving from the east 2,000 meters from his position.

Requests for immediate fires while the preparation is in progress.

Since the prep is still in progress, the FDO employs the fires of A/2-41 FA and B/2-41 FA against these targets of opportunity. These batteries were not scheduled in the prep and are available to respond immediately to calls for fire. Both missions are "adjust fire." The mission for TF 2-81 will be conducted on fire net 1 (F1) and the mission for TF 2-83 on fire net 3 (F3).

- If there are many targets to be planned, the DS battalion might find it necessary to include in the prep all fire units for which it has fire planning authority. When this situation exists and targets of opportunity appear that require immediate engagement, the S3 (or FDO) must take fire units from the preparation to fire these targets. He will attempt to select those fire units in range that are presently engaging the lower priority targets in the prep. He must also consider response time, especially since the targets of opportunity in this situation can degrade severely the forward momentum of the supported maneuver force. If a fire unit is firing a preparation target in the vicinity of the targets of opportunity, the S3/FDO should consider pulling that unit from the prep, giving it a range or lateral shift correction to bring the rounds close to the target, and directing the FIST to make subsequent corrections to place steel on the target.

- Regardless of the thought process used by the S3/FDO in determining fire units to be pulled from the prep, he must remember that those units reenter the preparation schedule at the time they finish firing the target of opportunity and will begin shooting the next target shown on the schedule. *No attempt* will be made to go back and fire the targets missed in the prep. The prep is on a time schedule that has been coordinated carefully with the scheme of maneuver. Maneuver forces expect the prep fires to be lifted at a specific time. If units pulled from the prep do not reenter at the *current* time indicated on the schedule of fires, their fires could extend past the completion time

ordered by the commander and jeopardize the safety of maneuver forces. The S3 notifies the requesting agencies of targets not fired during the prep and, if the requesting agencies desire, takes action to fire the targets as soon as possible after the prep is completed.

Immediate engagement of deep targets in conjunction with close air support.

The S2, 2-41 FA (DS), and the S2, 2d Bde, have developed targets behind the enemy's forward defensive positions from a variety of sources that consist primarily of assembly areas and potential chokepoints along east-west high-speed avenues of approach. The S2, 2-41 FA, has directed that these targets be sent to 2-42 FA (GSR) for immediate engagement (remember, 2-41 FA (DS) has been given first priority on the fires of 2-42 FA). The brigade FSO has advised the brigade commander that these targets include armor vehicles that obviously are preparing to move forward to reinforce the enemy's hasty defense. He recommends that the CAS be employed in conjunction with the field artillery, since airstrikes are more effective against armor. Diverted CAS is inbound and a forward air controller is on station to control the strike. This CAS mission could also be controlled by a ground FAC or a FIST chief if the situation precluded the use of an airborne FAC.

To facilitate field artillery fires on portions of the target area while the CAS is delivered, the brigade FSO recommended an informal airspace coordination area be established. The ACA calls for field artillery to be kept north of an east-west road running through the target area during the time that the airstrike is being delivered. Details of the ACA are worked out jointly by the brigade FSO and the air liaison officer. The informal ACA is disseminated to all fire units with the effective date-time group. (FM 6-20, appendix I, contains additional information on informal ACAs.)

As the CAS aircraft approach the target area, the forward air controller requests fires on four suppression of enemy air defense targets. These targets originated at the division FSE and had previously been sent to 2-43 FA (reinf) as on-call targets and are fired under control of the FAC. Two batteries of 2-43 FA (reinf) and three batteries of 2-42 FA (GSR) are firing SEAD in support of the CAS being employed against the enemy's attempt to reinforce. Four batteries (2-41 FA (DS) plus one battery from 2-43 FA) are also firing in response to calls for fire from FISTs.

Immediate counterfire.

As the battle progresses, the 2-41 FA (DS) fire direction center receives a SHELREP from B/2-41 FA reporting incoming mortar rounds on an azimuth of approximately 1,750 mils from their

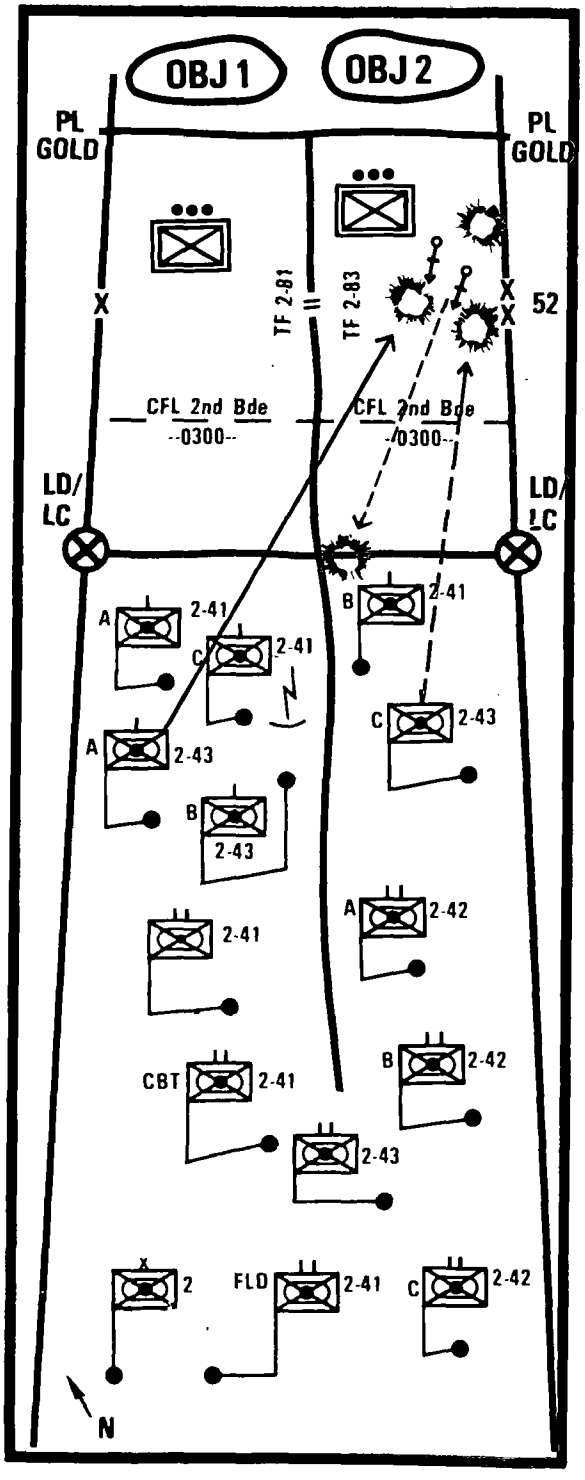
location. The FDC determines an orienting azimuth for the radar based on the SHELREP information. The S2 checks his targeting map and identifies two suspected enemy mortar positions within range of Battery B along the reported azimuth. Both of these suspected mortar positions are part of the countermortar program and have been assigned to two batteries of 2-43 FA (GSR). A/2-43 is available and is directed to fire immediately on the countermortar targets it has been assigned. C/2-43 has just completed firing SEAD targets and is directed to fire immediately on the other countermortar target. The DS battalion S3 notifies division artillery TOC of the incoming rounds and the action the battalion is taking. The weapon locating radar reports a fix on the enemy mortar position and the location is sent to A/2-43 FA and C/2-43 FA. The two batteries shift their fires to the new location, and fire two volleys each.

B/2-41 FA reports the incoming rounds have ceased and the battery is in the process of loading up and moving to its alternate location. Since the S3 is planning to displace the battalion forward, he orders the battery to disregard the alternate location and to move to a new primary position located approximately 3 kilometers behind the current frontline trace and approximately 8 kilometers west of objectives 1 and 2.

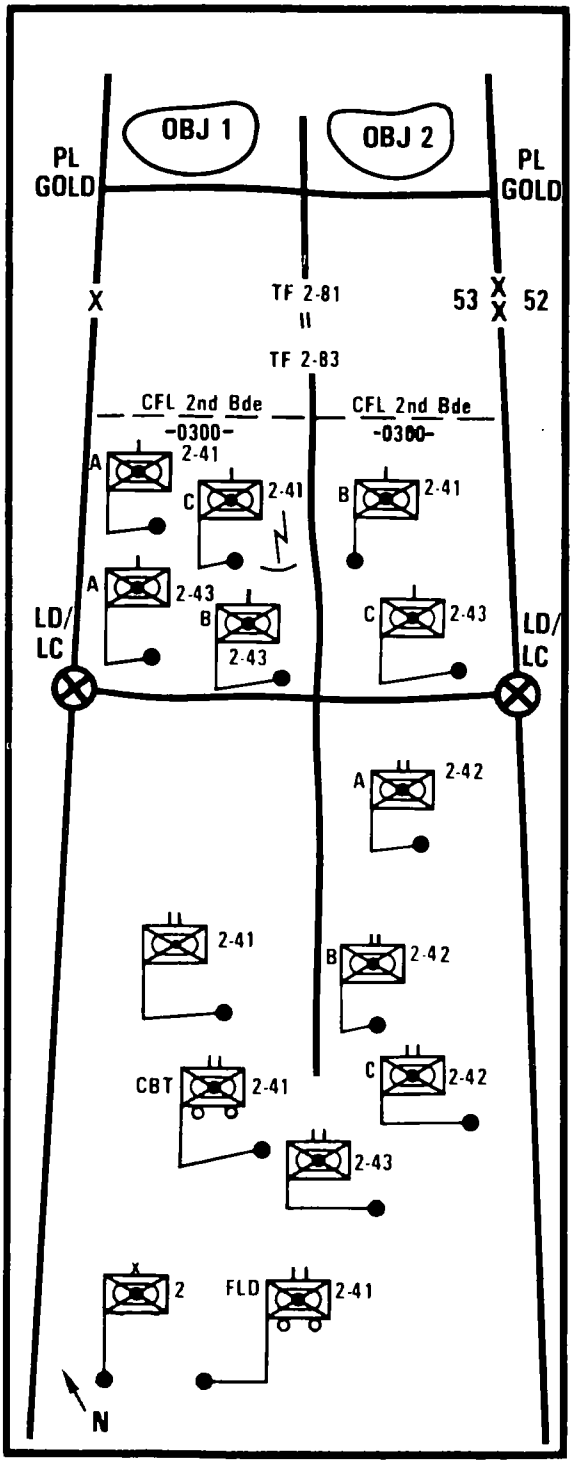
Displacement forward.

The S3, 2-41 FA, and the battalion commander have previously selected new

IMMEDIATE COUNTERFIRE



DISPLACEMENT FORWARD

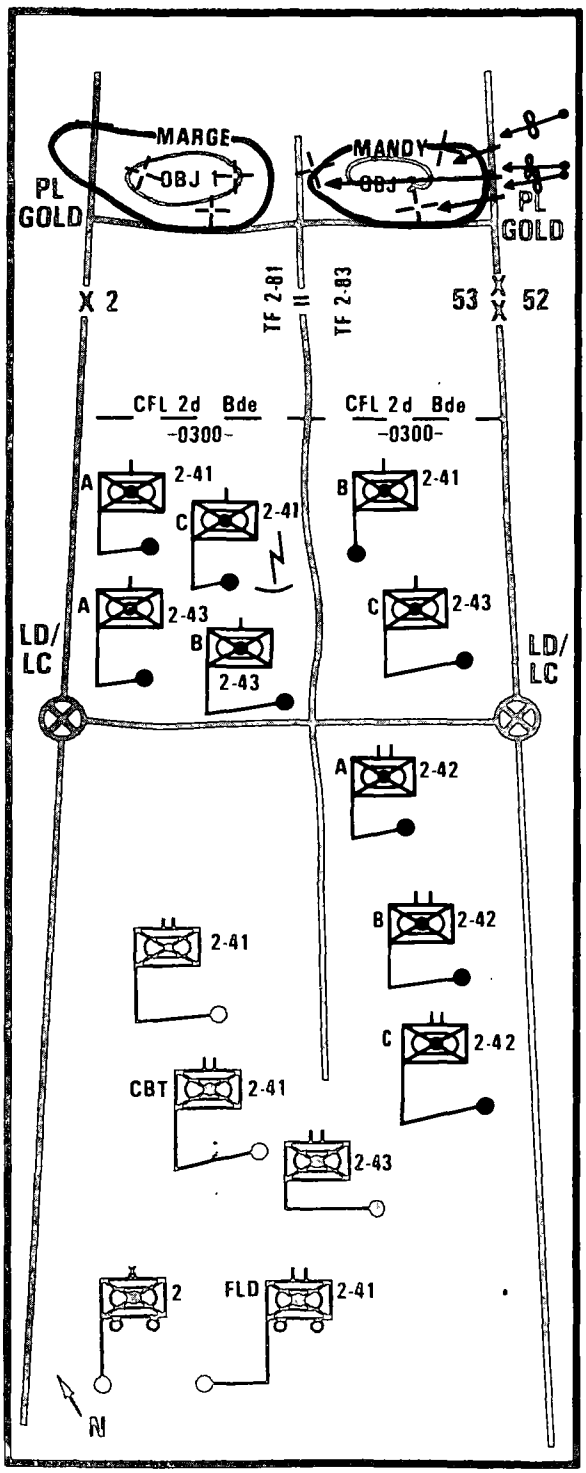


positions forward to support the securing and consolidation of objectives 1 and 2. Their selection was based on a combined map and air reconnaissance and subsequent ground reconnaissance conducted by reconnaissance parties from the headquarters, service, and firing batteries. The DS battalion commander directs the S3 to move both 2-41 FA (DS) and 2-43 FA (reinf) forward to the new locations. Movement will be by echelon for each of the battalions since reinforcing field artillery is available and 2-41 FA has first priority on the fires of 2-42 FA. The weapon locating radar will displace forward with C/2-41 FA. The positions selected for 2-41 FA (DS), 2-43 FA (reinf), and the WLR have been coordinated with and approved by the 2d Bde S3. The S3, 2-41 FA, requests that division artillery displace 2-42 FA (GSR) forward and recommends position locations for the firing units. Division artillery orders 2-42 FA to displace forward by echelon. The S3, 2-41 FA, coordinates all these moves to insure continuous fire support during displacement.

Fires planned in support of the assault.

TF 2-81 and TF 2-83 are within 1 kilometer of objectives 1 and 2 and are receiving sporadic direct and indirect fire. The battalion FSOs have each submitted a target list containing targets short of, on, and beyond the objectives to support the assault. The FSOs specified

PLANNED FIRES

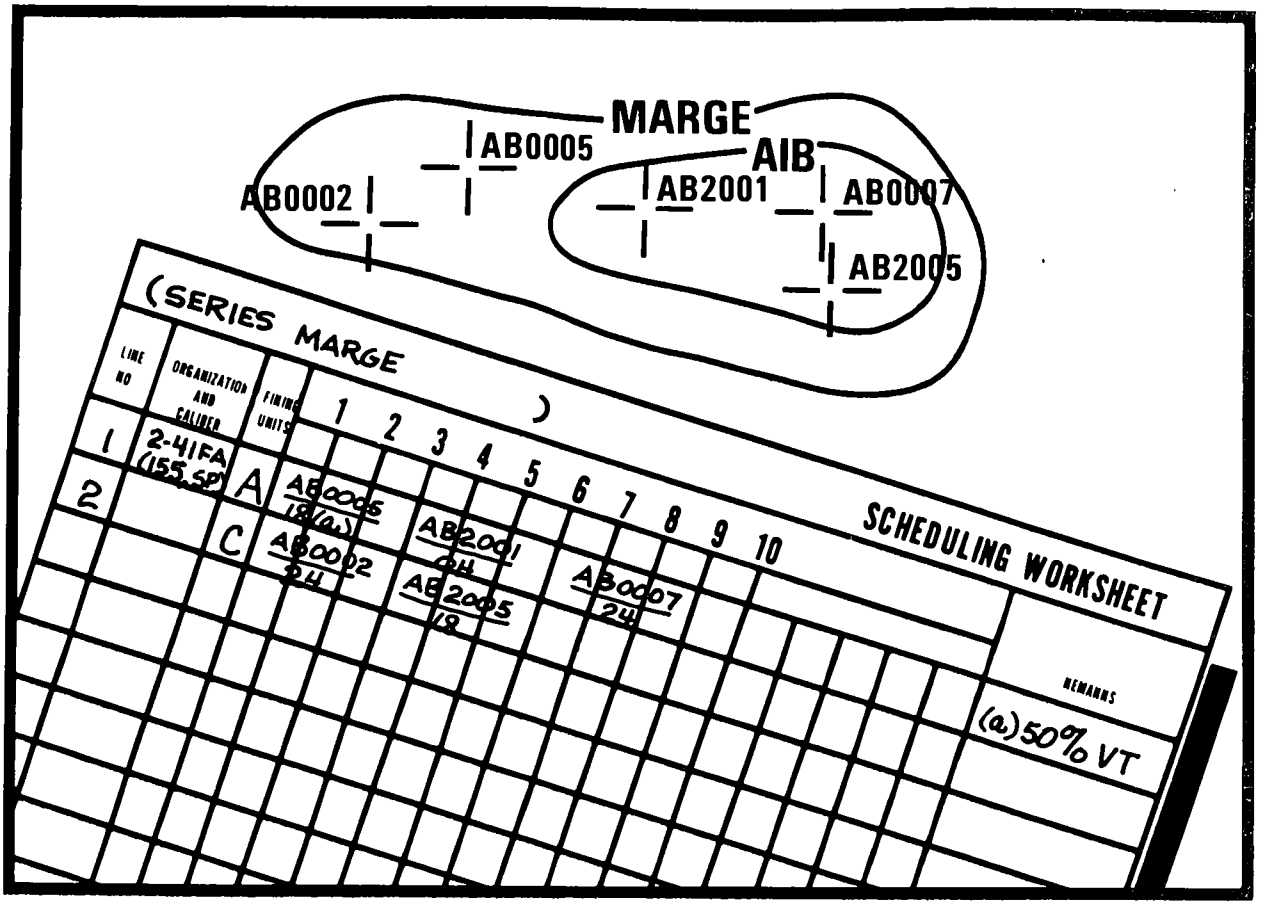


that these targets be planned as series to be fired on call. Based on the positions of fire units, in relation to the planned targets, the S3, 2-41 FA, designates A/2-41 FA and C/2-41 FA to fire the series in support of TF 2-81 and B/2-43 FA and C/2-43 FA to fire the series in support of TF 2-83. Scheduling worksheets are prepared for each series. Targets are transmitted to the designated fire units as series MARGE and MANDY to be fired on call. The requesting FSO is informed. (FM 6-20, appendix I, discusses the procedures for planning a series of targets.)

The brigade FSO recommends that CAS be used to strike the two objectives just prior to the assault. He informs the brigade commander that field artillery fires have been planned short of, on, and beyond the objectives. He briefs the brigade commander on the fires planned by the task force FSOs in support of the assault.

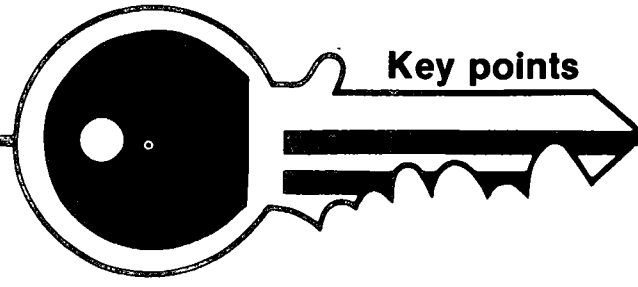
Personnel and equipment replacements.

When the assault begins, series MARGE and MANDY are called for and fired. Fires beyond the objectives continue until the consolidation is complete. Five howitzers have sustained significant damage but are reparable, and the battalion S4 requests direct support maintenance contact teams to repair the howitzers on site. He makes this request through the forward area support



coordinator at the brigade trains. B/2-41 FA had one howitzer extensively damaged during an enemy indirect fire attack. The howitzer was left in place when the battery repositioned forward and has since been recovered and evacuated to the rear for major repair. The battalion S4 has requested and received a float howitzer from the division support command, and a team from the battery is en route to the battalion's combat trains location to bring the howitzer forward in conjunction with a class V pickup.

Objectives 1 and 2 have been secured. 2d Bde receives a frag order terminating the nonstandard mission for 2-42 FA (GSR),and the brigade FSO notifies the S3, 2-41 FA (DS). The FDO immediately checks the targets that have been sent to 2-42 FA as on-call targets and transfers those targets to batteries of 2-41 FA and 2-43 FA (reinf) that are in range. FISTs/FSOs are also notified of this change.



Key points

During the attack, the cannon battalion accomplished the field artillery tasks in support of the attacking brigade by—

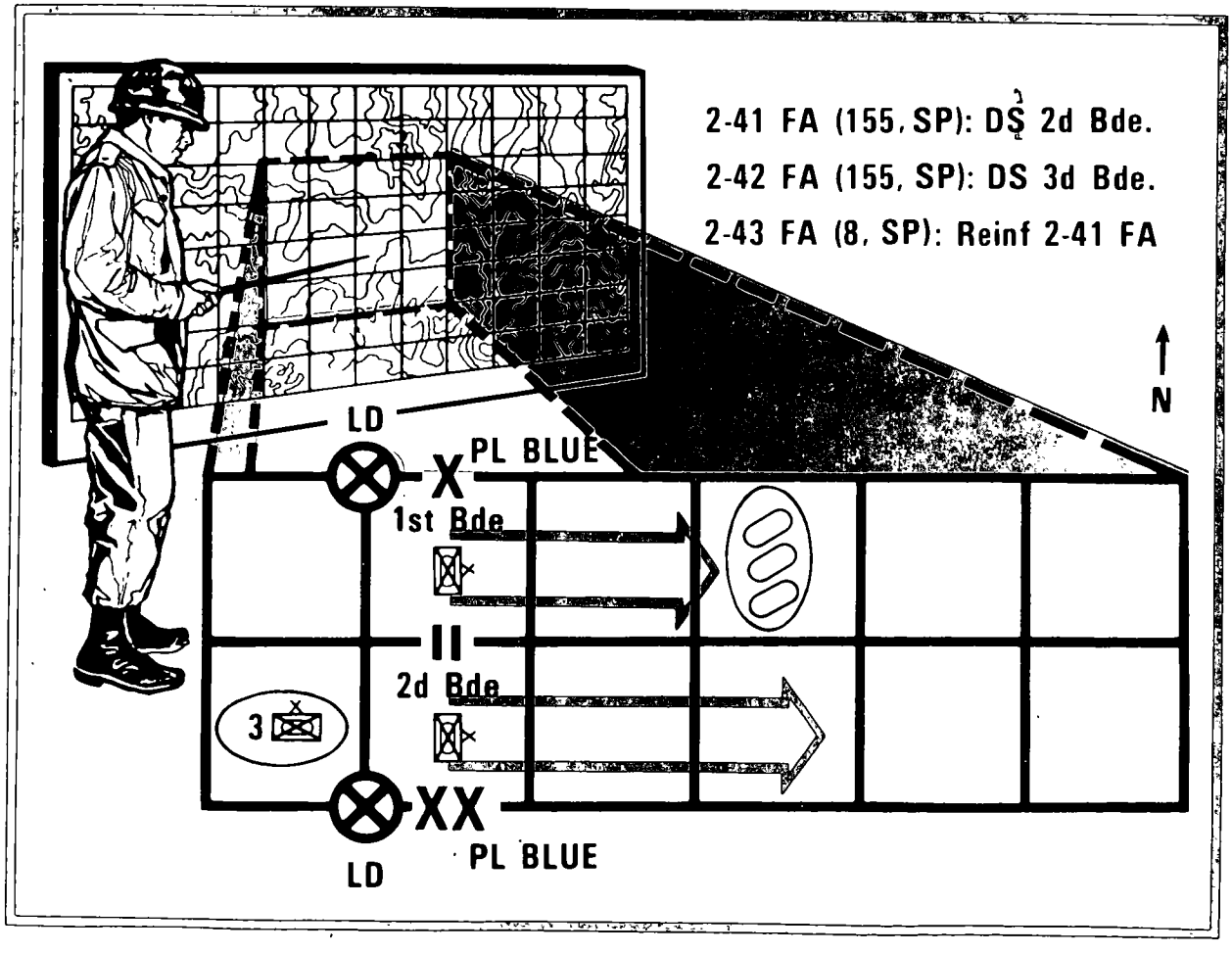
- Scheduling and firing a preparation.
- Answering requests for immediate fire.
- Engaging deep targets with massed fires in conjunction with close air support.
- Firing to support the assault and consolidation of the objectives.
- Displacing forward as the attack progressed while simultaneously maintaining the capability to provide adequate, responsive fire support to the brigade.

Exploitation/Pursuit Scenario

Situation continued.

The attack has been successful. The enemy is having recognizable difficulty maintaining his positions, PWs have increased significantly, and the enemy has been abandoning serviceable equipment in place. The division has been ordered to exploit. The 2d Bde will conduct an exploitation in the southern portion of the division zone. 3d Bde will follow and support 2d Bde.

The following scenario will focus on 2d Bde and 3d Bde to illustrate how a cannon battalion supports an exploiting brigade, and a follow and support brigade. Field artillery tactical missions are shown below.



Initial planning considerations, 2-41 FA.

In preparation for his tactical mission of providing direct support to 2d Bde (exploiting force), the commander, 2-41 FA, assembles his staff and issues the following guidance:

"The division artillery plans to establish a sound/flash base in our zone. Get a quick-fire channel established between our FDC and the sound/flash base. Get our weapon locating radar well forward.

"S4, logistics is going to be a significant problem during the exploitation. Keep the combat trains as far forward as possible and well stocked with class V, POL, and repair parts. Make sure that we have our recovery vehicles located with the combat trains, and make sure the batteries have tow bars. We may have to tow disabled vehicles forward and repair them when we can.

"We must make our first move forward as rapidly as possible; therefore, we will move by battalion. S3, coordinate with 2-43 FA (reinf); I want them to monitor our CF net and the FD nets while we displace forward. Calls for fire from FISTs will go directly to them. Make sure that the FSOs brief the FISTs. When we are in position and ready to fire, I want 2-43 FA to move forward by battalion, but not until we have good FM communications with the FISTs. During the exploitation, leapfrog the batteries forward with no more than two of the six batteries on the road at any time. Coordinate this closely with 2-43 FA (reinf) and include it in your briefing to the liaison officer from 2-43 FA when he arrives."

The commander's guidance above is intended to highlight those considerations that the commander of a cannon battalion DS to an exploiting force must take into account when planning to support an exploitation. Considerations requiring further amplification are:

Counterfire. The sound/flash base provides a capability to detect enemy artillery locations. The base is under division artillery control. Establishing a quick-fire channel between the base and 2-41 FA gives 2-41 FA the capability to respond *immediately* with counterfire against enemy indirect fire attacks. When 2-41 FA displaces forward (by battalion), the quick-fire channel should be reestablished between the sound/flash base and 2-43 FA (reinf).

Initial displacement forward by the battalion. As the brigade begins to exploit, moves forward must be made as rapidly as possible. The battalion commander has elected to displace his entire battalion forward simultaneously and rely on the reinforcing battalion (2-43 FA) to handle fire requests from

FISTs/FSOs while the movement is in progress. This is not a "rule of thumb," but rather a consideration that must be weighed against:

- **The degree of enemy resistance expected and the corresponding need for field artillery support during the initial stages of the exploitation.**
- **Routes available.**
- **The availability of reinforcing field artillery.**

Immediate counterfire. As lead elements of 2d Bde move into the exploitation phase, they come under enemy indirect fire attack. The S3, 2-41 FA (DS 2d Bde), immediately orders the countermortar program fired, and contacts division artillery requesting counterbattery on all known or suspected enemy artillery positions within range of the brigade's lead elements. The weapon locating radar acquires locations of two mortar positions, and the S3 pulls two batteries from the countermortar program to fire on these targets. The sound/flash base also acquires a fix on an enemy artillery location and this target is sent to 2-43 FA (reinforcing 2-41 FA) and is fired as a battalion mass mission. The enemy indirect fire attack ceases. The S3, 2-41 FA, notifies division artillery and 2-43 FA that incoming has ceased. The 2d Bde FSO recommends that the three confirmed targets be designated as priority targets with two howitzers laid and ready to fire on each target. The brigade commander directs that the priority remain in effect until 3d Bde passes the target locations. The FSO notifies 2-41 FA, and the S3 assigns the priority targets to 2-43 FA (reinf).

Field artillery fire planning for the exploitation.

The exploitation continues with the majority of the field artillery missions fired being targets of opportunity. At this stage, very little fire planning can be accomplished, since the enemy is moving rearward rapidly and targets are moving constantly. If the brigade leaves units in position to fix bypassed enemy forces until follow and support forces arrive, 2-41 FA (DS 2d Bde) must make provisions to support the fixing force by—

- **Answering calls for fire on targets of opportunity from FSOs/FISTs with the fixing force.**
- **Firing on escape routes to assist the fixing force in containing the enemy force (FSOs/FISTs will designate where and when these fires are needed).**
- **Insuring that fire support coordination measures are established to facilitate coordination of fires in support of the fixing force and the follow and support force.**

Span of control problems during exploitation.

☐ Span of control can become a problem during an exploitation or pursuit, especially if the exploiting force is able to strike swiftly and deeply into enemy territory. Decentralization of fire control may be appropriate during this type operation. If it becomes obvious that the force artillery headquarters

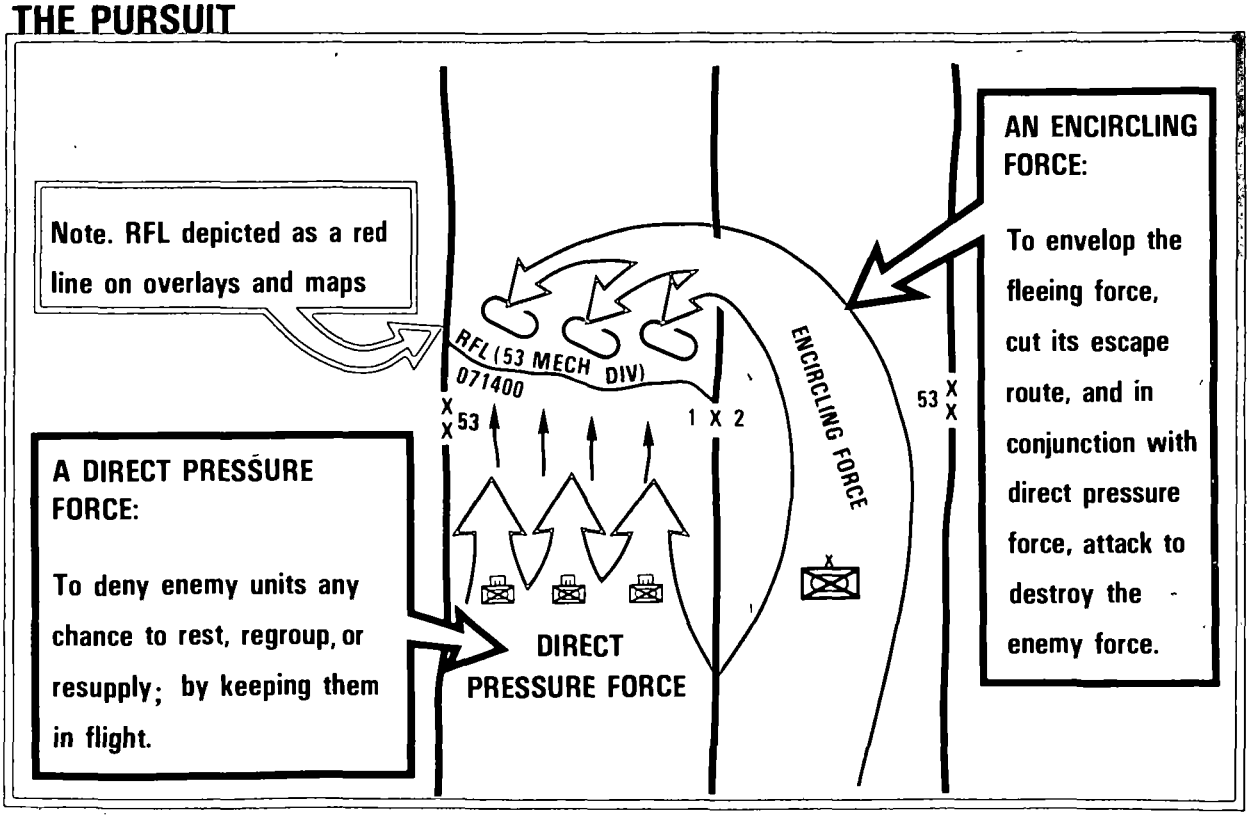
(division artillery in this case) is so far behind the exploiting force that it cannot control artillery with the force effectively, the artillery should be attached to the force. If direct support and reinforcing artillery are moving with the exploiting force, formation of a battalion group would be a viable method of reducing span of control problems. In this scenario, the division attaches 2-43 FA (reinf) to 2-41 FA (DS 2d Bde) to form a battalion group and then attaches the battalion group to 2d Bde. Normally, the battalion group commander is the DS battalion commander. Command relationships are specified in the attachment orders.

The pursuit.

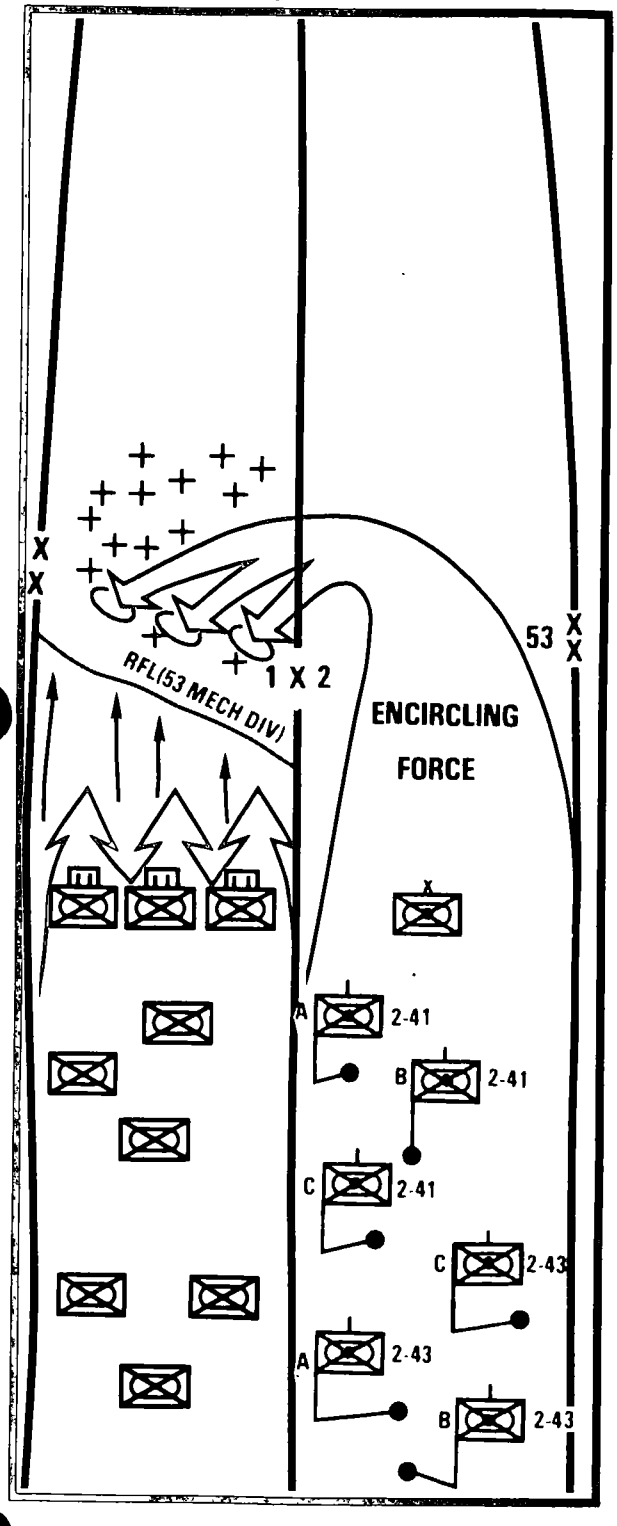
- Like the exploitation, field artillery fire planning for the pursuit will be hasty and informal. Planning is accomplished to support both the encircling force and the direct pressure force.

In the situation depicted below, 1st Bde is maintaining pressure on the retreating enemy force while 2d Bde advances on the flank of the enemy force to encircle it and cut off its escape routes.

THE PURSUIT



PLANNED FIRES



2-40 FA (DS 1st Bde) plans fires to—

- **Slow and wear down the enemy force.**
- **Suppress enemy rear guard and strongpoint units so that 1st Bde can bypass them and maintain contact with the main force.**
- **Mass fires on enemy forces concentrated at chokepoints such as defiles and bridges.**

2-41 FA (DS 2d Bde) plans fires to—

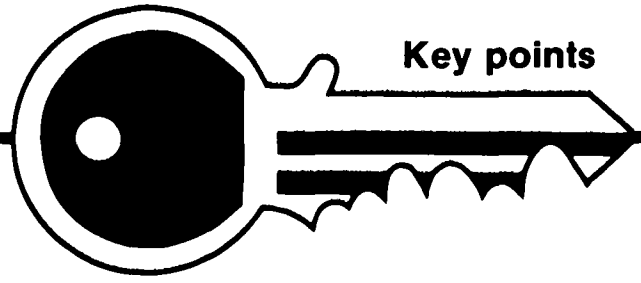
- **Slow and wear down the enemy force.**
- **Suppress enemy positions so that the brigade can bypass them rapidly.**
- **Mass fires on the enemy main body when the encirclement is complete.**
- **Support a flank attack by 2d Bde if 2d Bde is unable to outdistance the enemy main body.**

To impede the enemy's rearward progress, the 2d Bde FSO and the brigade S2 select targets that cover potential escape routes. The FSO and the air liaison officer work out a plan that uses a combination of close air support and field artillery on these targets, and the FSO briefs the brigade commander quickly. The commander approves the plan, and while the ALO initiates the immediate close air support requests, the brigade FSO passes the field artillery targets to

2-41 FA (DS 2d Bde). Since some of the targets on the FSO's list are out of range, the S3 elects to have 2-43 FA (reinf) remain in position to fire the targets in range while 2-41 FA displaces to positions selected by map reconnaissance that are within range of the deepest targets on the FSO's target list. The move is made by echelon with two firing batteries in the first echelon and the remaining firing battery in the second echelon. If the brigade requires fires from more than one battery while the first echelon is moving, 2-43 FA (reinforcing 2-41 FA) is available and in position to fire.

At the new positions, the batteries use hasty survey techniques to establish position and directional control. If met data is available and muzzle velocities are current, met + VE will be used to maintain the capability to mass fires accurately.

2d Bde completes the encirclement and 1st Bde is maintaining pressure on the enemy force, driving it into the 2d Bde. Division has established an RFL between 2d Bde and 1st Bde to facilitate coordination of fires. In conjunction with CAS sorties, 2-43 FA (reinf) is firing planned mass fires on gaps, escape routes, and on the encircled force.



Key points

- An exploitation marks the beginning of the end for the enemy force.
- The exploiting force advances rapidly into the enemy's rear, bypassing small pockets of resistance and destroying lightly defended installations and troop concentrations.
- The pursuit focuses on total destruction of the enemy force.
- Field artillery, when supporting forces in the exploitation/pursuit must keep up with the forward momentum of maneuver forces while maintaining the capability to provide responsive support.
- The demand for combat service support will be continuous—especially for ammunition and POL.

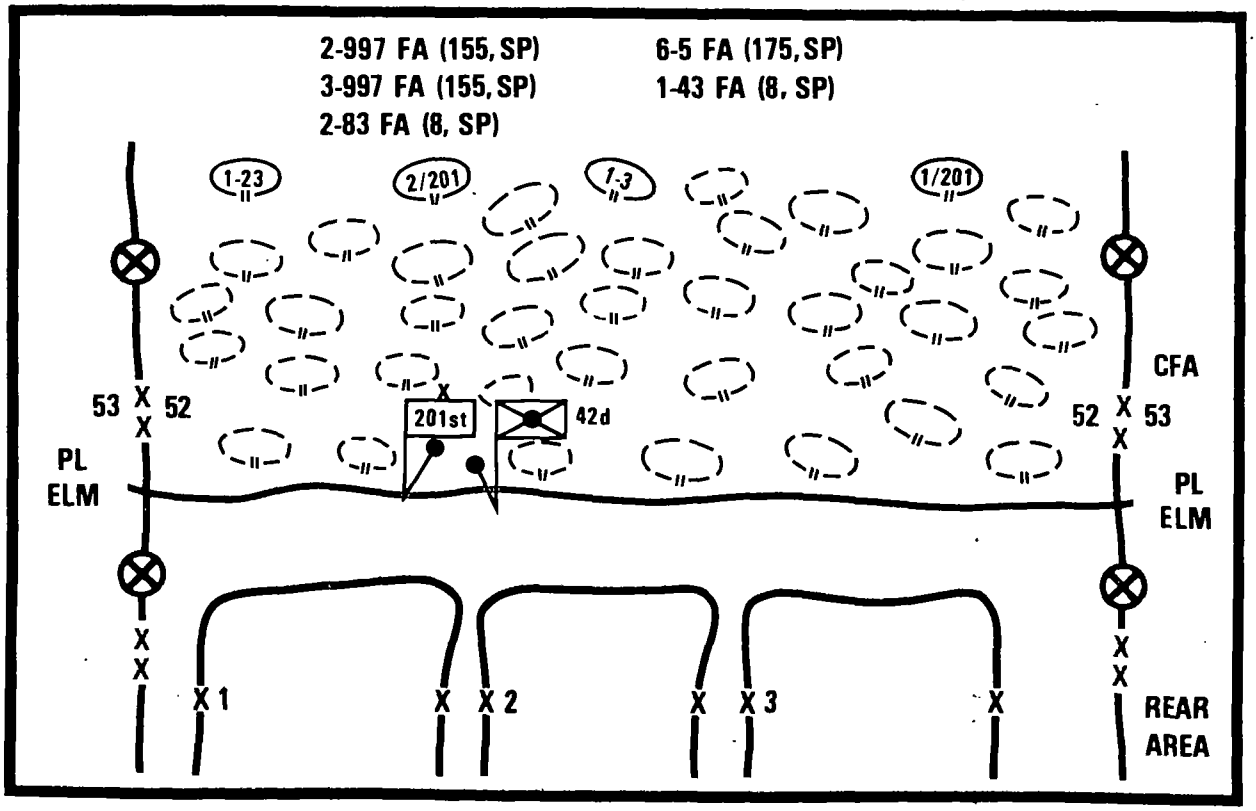
Covering Force Scenario

Situation.

The 52d Mech Div has been given a mission to establish a covering force and defend in sector. The division receives attachment of the headquarters and two squadrons, 201st ACR, and the division commander has decided to employ the ACR headquarters as the command control headquarters for the division covering force. He attaches the divisional cavalry squadron (1-23 Cav) and one tank-heavy task force (TF 1-3 Armor) to the 201st ACR to round out the covering force.

The 42d FA Bde is attached to the division and the division commander further attaches the field artillery brigade to the covering force. The field artillery brigade consists of the field artillery battalions shown below.

THE COVERING FORCE IS DEPLOYED AS SHOWN BELOW.



Field artillery organization for combat.

2-997 FA has been assigned the tactical mission of direct support to TF 1-3. The mission statement is as follows:

2-997 FA (attach one battery to 2-83 FA, receive one battery attached from 2-83 FA): DS TF 1-3 Armor; on order, GSR 1-41 FA. Upon change of control, attached batteries revert to parent battalions.

The implications of this mission follow:

DS TF 1-3 Armor. Normally, one artillery battalion is placed in direct support of a maneuver brigade. However, because of the wide frontages and fluid nature of the fight in the covering force area, the division commander's organization for combat places an artillery battalion in direct support of each task force/squadron in the covering force. The DS battalion commander is the FSCOORD for the task force and the task force FSO becomes the assistant FSCOORD.

Attach one battery to 2-83 FA, receive one battery attached from 2-83 FA. 2-997 FA is a 155-mm battalion and 2-83 FA is an 8-inch battalion. The cross-attachment of 155-mm and 8-inch batteries within the covering force artillery does two things:

(1)

Insures the most responsive fires by precluding a "pure" 8-inch battalion in direct support of the task force. The howitzer battery (155-mm) provides the capability to fire smoke and illumination in support of TF 1-3. These ammunition types are not available for 8-inch howitzers.

(2)

Insures representative calibers, enhancing the covering force's efforts in deceiving the enemy as to the location of the forward edge of the main battle area.

On order, GSR 1-41 FA. This tells the 2-997 FA that it will have a change of mission in the vicinity of phase line ELM.

Attach one battery to 2-83 FA. This tells the 2-997 FA that one of its batteries is to be attached to 2-83 FA.

The 2-997 FA has no reinforcing artillery; however, 1-41 FA, one of the MBA cannon battalions, has the following mission:

1-41 FA (155, SP), DS 2d Bde, priority of fires initially to 2-997 FA.

This mission tells 2-997 FA that it has first priority on the fires of 1-41 FA for as long as 2-997 FA has the mission of DS, TF 1-3. When TF 1-3 comes under control of 2d Bde, it receives its field artillery support from 1-41 FA.

Missions assigned to field artillery battalions supporting covering force operations vary in complexity depending on how the force commander envisions fighting the battle and the field artillery units available. The missions assigned to 2-997 FA and 1-41 FA are representative of the more complex missions that could be assigned.

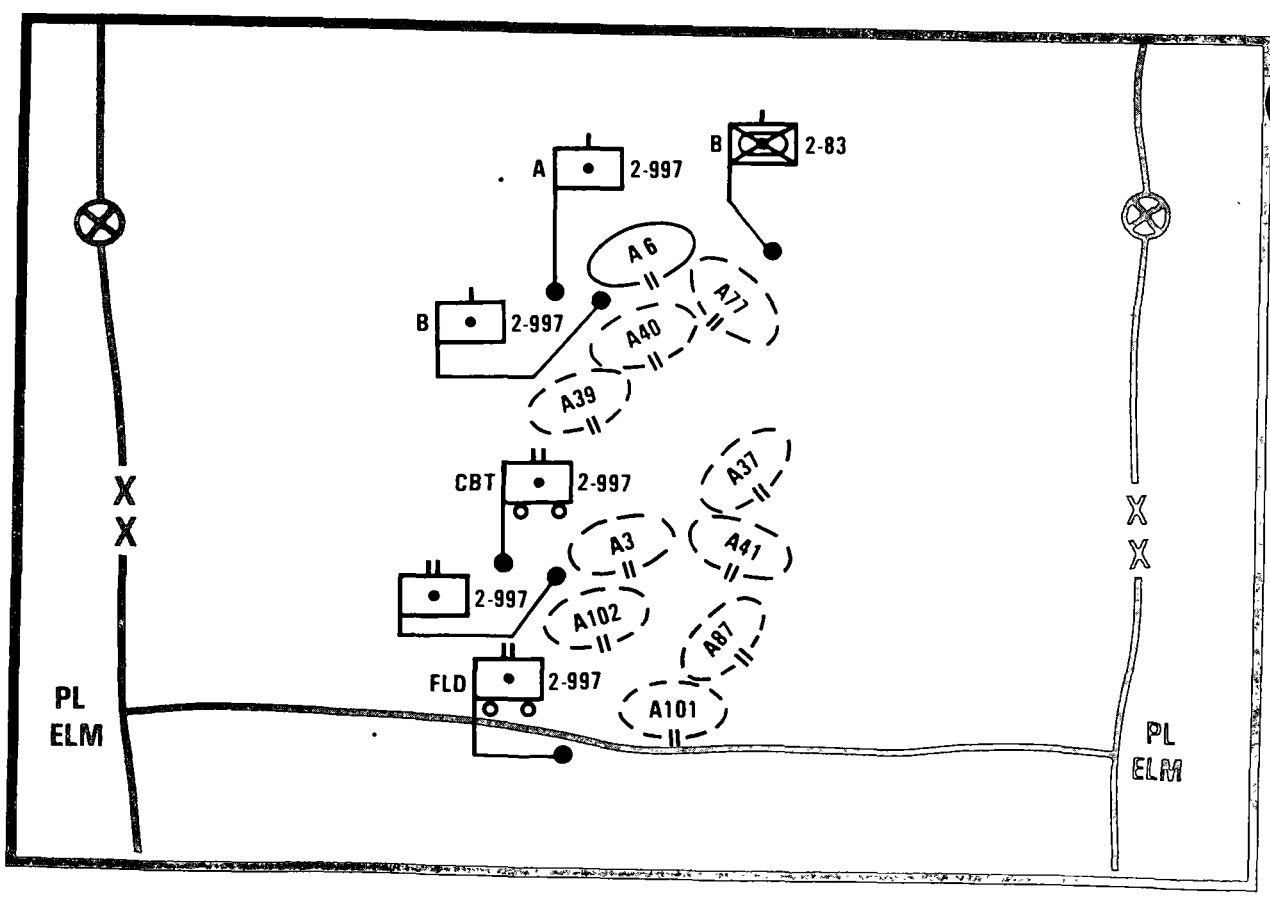
Positioning.

To support TF 1-3 in the initial stages of the covering force battle, selected FA locations are shown below. Batteries are in position and all positions are being hardened to the extent that resources permit, and survey control has been extended to the firing batteries.

The major considerations for positioning field artillery fire units in the covering force are the range at which targets can be acquired and the ability to provide continuous support without excessive displacement. Field artillery should not be positioned farther forward in the CFA than needed to fire on those targets that can be located accurately. Other considerations in positioning fire units in the CFA are:

- **Defensible terrain.**
- **Routes to next most likely position.**
- **Routes for ammunition resupply.**
- **Potential enemy avenues of approach and fields of fire into the position.**
- **Alternate locations.**
- **Cover and concealment.**
- **Communications masks.**

These considerations are amplified in chapter 3.



Based on the maneuver commander's guidance, the battalion commander, 2-997 FA, meets with his S3, communications-electronics staff officer, HHB commander, S4, and XO, and issues his guidance for initial positioning of the HHB and service battery.

"I'm concerned about the positions we select for the CP and the battalion trains. I want a small headquarters element made up of the S2, S3, operations/FDC complex. Locate it as close as possible to TF 1-3's CP. Our fire units are pretty well spread out, so make sure we can talk. S4, put out field trains as close as possible to the COSCOM forward support element. We may be able to resupply class V by helicopter, so insure that the combat trains area has a suitable helicopter landing site. Establish a recovery capability with the combat trains. I don't want any equipment left behind. If equipment must be left behind, make sure that the batteries have the capability to destroy or disable it in place. XO, I want the firing batteries light in everything except class V. Have all the ammunition sections consolidated under the ammunition officer's control. Tell him I want movement of single ammunition vehicles to and from the ASP as opposed to resupply convoys. This will reduce our vulnerability to enemy air attack."

Employment of target acquisition elements.

The S2, 2-997 FA, has coordinated closely with the TF 1-3 S2 in order to integrate field artillery target acquisition into the TF 1-3 information collection plan. The 2-997 FA has one weapon locating radar attached. The S2 has determined a

general location for the WLR that provides coverage in the area of the main enemy avenue of approach into TF 1-3 Armor's position. The radar section chief will select the exact site. The S2 will orient the radar and assign sectors of scan based on the current estimate of enemy dispositions. As the situation develops, sectors of scan for the radar will be modified based on reports of enemy firing received from FISTs and FSOs. The S2 must monitor closely the developing enemy situation with respect to the position of the radar and plan for rearward locations for the radar as the battle develops.

Field artillery fire planning.

The field artillery fire planning effort is an ongoing process within the 2-997 FA FDC under the supervision of the battalion S3. Initial target lists have been received from the task force FSO and have been incorporated into the field artillery support plan. Initial target information is sketchy at this point and consists primarily of fires planned on likely approach routes beyond the direct fire range of the supported teams. Team B, TF 1-3, is astride the most likely enemy avenue of approach into the task force area. The task force commander has specified priority of fires initially to Team B. Whenever the number of targets exceed the battalion's capability for immediate engagement (to include reinforcing field artillery), the FDO must insure that targets called for in support of Team B are engaged first.

As the battle develops, the fire planning effort will focus primarily on:

- **Fires on the approaching enemy to slow his advance and increase target servicing time for the maneuver force.**
- **Fires to assist the disengagement and repositioning of maneuver elements.**
- **Fires on enemy penetrations.**

The FSOs submit targets to be included in the above planning effort by wire (if available), by messenger, or by FM communications, in that priority. The S3 does not wait until his field artillery support plan is complete with targets and schedules to transmit target data to fire units. Target data is transmitted to fire units immediately. Most of the field artillery support plan, if published, will be written information that has already been passed verbally.

Met/registrations.

Two met stations have been established in the covering force area (42d FA Bde's organic met section and a forward met station from 52d Mech Div Arty). 52d Mech Div Arty's met station is closest to 2-997 FA's fire units and within communication range. Valid mets are being received and the battalion has calibrated recently so the S3 elects to fire met + VE in lieu of registering. (Other registration options available are discussed in FM 6-40, chapter 11.)

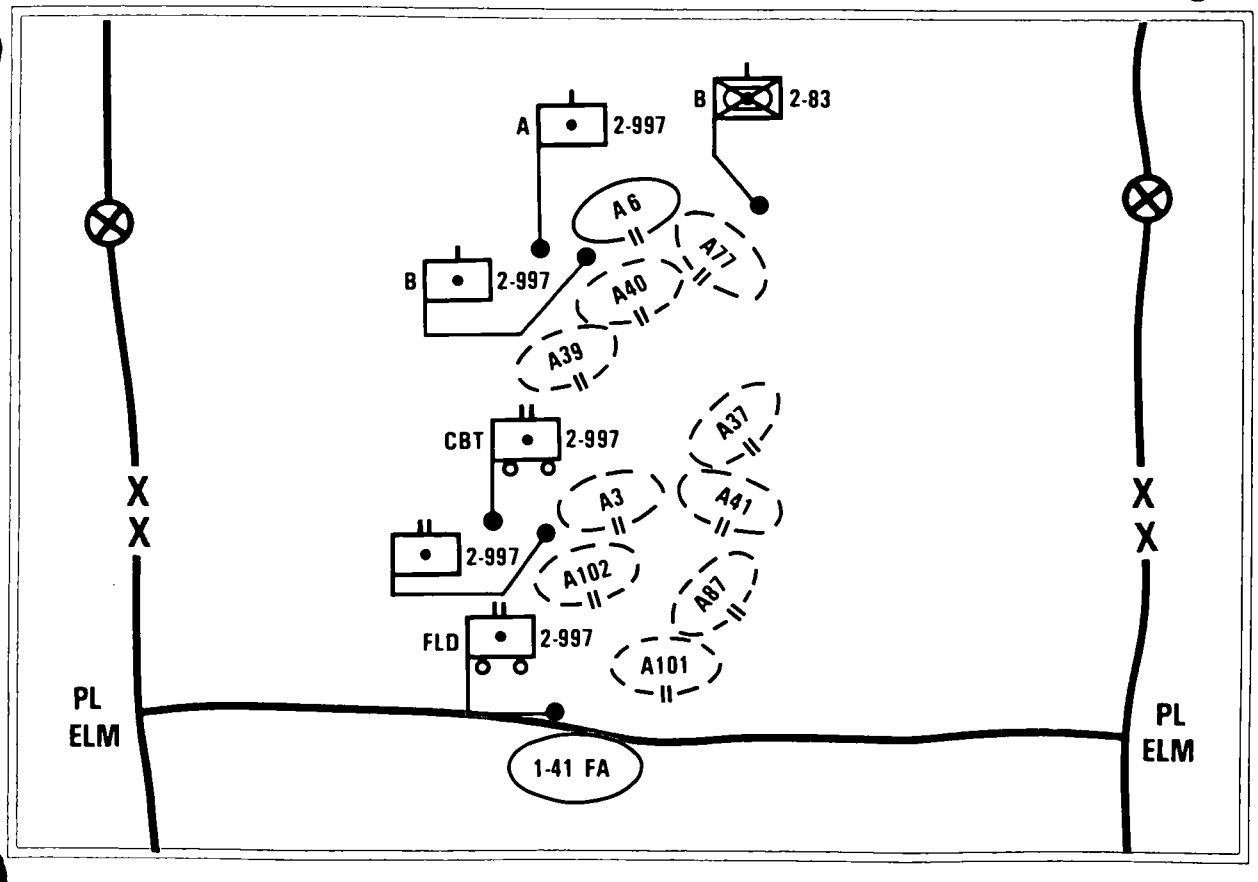
Communications.

In anticipation that sufficient time would be available to lay wire from the battalion to the batteries and to the FSO with TF 1-3, the S3 instructed the operations sergeant to open only the CF net initially. Additional FM nets will be

opened *only* as necessary to handle increased traffic as the situation develops. Since wire has *not* been laid to the FISTs, all necessary radio traffic between the three FISTs, the FSO, and the battalion will be conducted on the battalion CF net. The S3 is aware that when contact is made, FM traffic will increase. At this time, traffic should be minimal and consists of FISTs transmitting target lists to the FSO. By wire, the FSO passes consolidated target lists, fire support measures, and maneuver control measures to the battalion operations/FDC. Depending on distances and time, this type traffic could be carried by messenger. (2-997 FA is a corps field artillery battalion and is authorized only one CF net and one FD net.)

Location of 1-41 FA (MBA battalion with priority of fires to 2-997 FA).

The S3, 2-997 FA, is concerned about the location and status of 1-41 FA. For him to exercise his first priority on calls for fire as early as possible, 1-41 FA must be positioned in forward supplemental positions within FM communication range. S3, 2-997 FA, has recommended (through the field artillery brigade to division artillery) a position area approximately 11 kilometers forward of the MBA. This area is within FM communication range of his location and still allows 1-41 FA to maintain communication with division artillery and the brigade and battalion FSOs with 2d Bde. From these supplemental positions, 1-41 FA fire units can range to



4 kilometers beyond the initial line of contact. The 42d FA Bde confirms that 1-41 FA is moving to occupy supplemental positions that approximate those recommended by the S3. Closing time and battery centers will be transmitted as soon as movement is completed.

Immediate action status.

The battalion commander directs an immediate action status of "stay in position." The S3 alerts the batteries that they will move to alternate locations *only* if their positions become untenable as a result of enemy indirect fire attacks.

The commander analyzed the risks associated with the "stay in position" status against the temporary interruption of field artillery support associated with the "move to alternate location" status. Based on this analysis, he ruled in favor of having maximum field artillery cannons in position and ready to fire during the critical initial stages of the battle. As the battle develops and the fires of 1-41 FA can be brought to bear on the advancing enemy force, the commander may reevaluate the status and consider going to "move to alternate location."

Reconnaissance and combat service support considerations.

The commander, 2-997 FA (DS TF 1-3), is concerned about the movement of his battalion during the covering force fight and about certain combat service support considerations that may affect the battalion's capability to provide adequate field artillery support. He issues the following guidance to his staff:

"S3, we need to recon for new positions. As positions are selected, coordinate with the S2 to get the survey effort extended to the new positions. Based on the depth of the covering force, we should plan on at least two moves on this side of the MBA. We don't have a reinforcing unit so plan on moving by battery. I want at least two of our three batteries in position to fire at all times. XO, you work with the S1 and the S4 to insure that personnel and equipment replacements that cannot be brought forward are delivered to the batteries as soon as possible following occupation of positions in the MBA. S3, make certain that target damage assessment is sent to firing batteries whenever possible. Let them know that their fires are, in fact, taking a toll on the enemy. S1, get locked in with the TF 1-3 S1 regarding refugee control and make sure that you keep the S3 informed on movement of refugees through the covering force area. They could become a problem as the battle develops, and the last thing we need is a battery move delayed because the selected movement route is choked with refugee traffic."

Initial engagement of enemy forces.

Five to seven lightly armored vehicles and troops on motorcycles are moving toward TF 1-3 Armor's initial battle position. Rate of movement is estimated at 10 to 15 kilometers per hour, and their route is toward a location where remote sensors have been placed. The sensor locations were previously sent to the 2-997 FA FDC by the task force FSO to be planned as on-call targets. The FSO requests that 2-997 FA prepare to fire on the sensor locations. He determines that if the enemy force continues at its present rate, it will pass through the sensors within the next 5 minutes. B/2-83 FA and B/2-997 FA are both in range of the sensor locations and both batteries have firing data already computed since they had previously received these sensor

locations as on-call targets. The battalion FDO specifies a battery three rounds HE/VT for B/2-83 FA and a battery three rounds for B/2-997 FA. When the sensors are triggered, the task force FSO contacts the FDO and the FDO directs Batteries A and B to commence firing. While this mission is in progress, the FIST chief with Team A requests fires "at my command" on light tanks approaching the vicinity of target 252 (this target was submitted by the FIST on his initial target list as an on-call target, and firing batteries have computed data). As the tanks approach target 252, the FIST chief gives the command to fire. A battery four rounds DPICM from A/2-997 FA causes the reconnaissance element to slow down, button up, and disperse.

Fires to support maneuver disengagement.

As the battle continues, Team B, astride the main enemy avenue of approach, is engaging a large, tank-heavy enemy force that is closing rapidly on its position. To preclude the loss of freedom of maneuver, Team B is ordered to move to its next battle position. The FIST with Team B had planned smoke and HE fires to support the team's disengagement and submitted these targets to the task force FSO as on-call targets. The FSO assigned the smoke targets to the task force mortars and the HE targets to 2-997 FA. As Team B begins its disengagement, the FIST chief calls for the planned targets to be fired at his command. A/2-997 FA and B/2-997 FA are the units designated to fire, and the FDO directs them to contact the FIST on the fire direction net. (Fire requests and the volume of FM traffic have necessitated opening an additional FM net.) The FIST controls the mission, integrating the smoke targets from the task force mortars, and Team B successfully breaks contact and moves to its next position. The task force FSO relays the new positions to the 2-997 FA FDC. These control measures are plotted on all maps and charts and transmitted to the firing batteries and to force artillery headquarters.

Displacement—fire units and trains.

As the covering force fight continues, maneuver forces and supporting field artillery have inflicted significant losses on the enemy force but relentless pressure has forced covering force units back toward the MBA. 2-997 FA has displaced to new positions along and just forward of battle position A87.

The XO, 2-997 FA, briefs the commander on the current disposition of battalion trains.

"Sir, we have relocated the field trains in a small village close to the current location of the COSCOM forward support element. Roads in the area are adequate.

Buildings in the area provide good cover and concealment and sheltered areas for maintenance operations. In anticipation of the necessity for rapid displacement, I have instructed the S4 to set up and occupy buildings along the edge of the village. The position offers good concealment from overhead observation and roads are adequate. We are clearing a small area for helicopter landings to handle aerial resupply of class V. Class V resupply has posed no significant problem yet, but our vehicles are taking a beating. The S4 is on top of this and has an ample supply of small repair parts with high usage rates on hand at both trains locations."

Immediate counterfire.

The FIST chief with Team B reports incoming mortar rounds and requests immediate counterfire. The S2, 2-997 FA, informs the WLR to orient to a new sector of scan that corresponds to the center of the task force area. 2-997 FA has a countermortar program planned, and the S3 orders it fired immediately. The FIST chief calls in an approximate azimuth to the enemy mortar location and the S2 plots this azimuth on his map. A suspected mortar location lies approximately 750 meters left of the azimuth and is being fired as part of the

countermortar program. The suspected location plots outside the sector of scan that the S2 had initially sent to the radar. He directs the radar to adjust the sector of scan and the radar acquires a fix on the mortar location. B/2-997 FA and B/2-83 FA are massed on the target, and the FIST chief reports that incoming has ceased. The TF commander designated the mortar location as a priority target until Team B moves from its present location.

Field artillery fires planned to support obstacles.

Team B (still positioned astride the main enemy avenue of approach) is preparing to move to its next battle position. The TF commander had previously dispatched the attached engineer platoon to the team's current location with instructions to construct obstacles (ditches, felled trees, and mines) on the north-south roads and trails leading through the position.

2-997 FA continues to fire on the advancing enemy force to slow them down and keep them buttoned up. The FSO designated field artillery targets to support the obstacles and forwarded them to 2-997 FA to be planned as a group of targets and fired on call. Under extreme pressure, Team B moves to its next battle position, and as lead elements of the enemy force hit the obstacles, the planned groups are called for by the FSO. The groups are fired with a mix of HE/VT and DPICM. These fires and the obstacles slow the enemy's movement significantly. Immediate close air support has been requested, and when the fighters arrive on station, the field artillery fires are switched from the obstacles to SEAD targets. These targets consist of known and suspected enemy air defense weapon locations along the routes to be used by the CAS aircraft and air defense weapons in the area of the airstrike. As Team B moves into its new position, the Team FIST continues to adjust field artillery fires on enemy elements. The field artillery fires slow them down, increasing target servicing time for the tanks and TOWs with Team B.

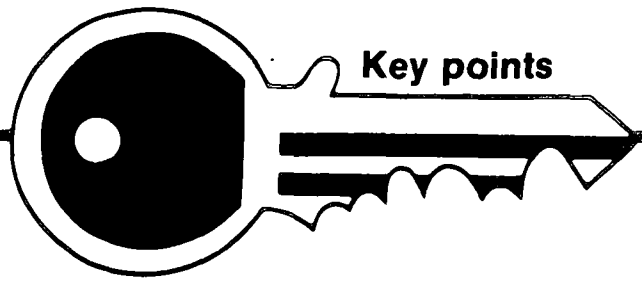
Priority of fires.

Up to this point priority of field artillery fires has been to Team B; however, when Team A comes under attack by an estimated battalion-size enemy force, the task force FSO recommends, and the TF commander approves, shifting priority of fires to Team A. The FSO immediately notifies 2-997 FA of the change and the FDO briefs all FDC personnel. Priority of fires will be critical during covering force operations, and the FSO is a key adviser on this decision. The task force commander will decide the priority of fires based on his FSO's recommendation. As the TF commander repositions his maneuver forces in response to the developing enemy situation, he and his FSO must determine which team has the most critical need for immediately responsive fire support. Whenever the DS field artillery battalion has more calls for fire than it can handle with the fire units available, the FDC will respond *first* to calls for fire from the team that has priority of fires.

Preparations for change of mission.

The covering force line of contact is along PL ELM. 1-41 FA has repositioned into the MBA but can still range beyond the line of contact. Division artillery has sent an MBA position area for occupation to 2-997 FA. The S3 outlines plans for the on-order GSR mission to 1-41 FA.

"Sir, 1-41 FA is monitoring our fire nets and has communications with all of TF 1-3 Armor FISTs and the FSO. As the task force continues to fight back to the MBA, the FISTs will continue to request field artillery fires on the same nets they are presently using. This will facilitate change of control and preclude the confusion of frequency changes during the passage. We will remain in our current positions until change of control. When change of control is ordered into effect, I recommend that we move to our initial MBA location by echelon. I have already dispatched a liaison officer to 1-41 FA to establish a quick-fire channel with them. I have a chopper laid on for air reconnaissance of the new position area and the batteries have been alerted to have reconnaissance parties ready to go. Survey and wire laying will commence as soon as battery locations are selected. The CESO has instructed wire laying teams to dig in wire or install it overhead when possible. The XO is coordinating with TF 1-3 on routes and passage points into the MBA. 2d Bde units will have guides stationed at the passage points to lead us through 2d Bde's forward defensive positions. We will move under brigade control."



Key points

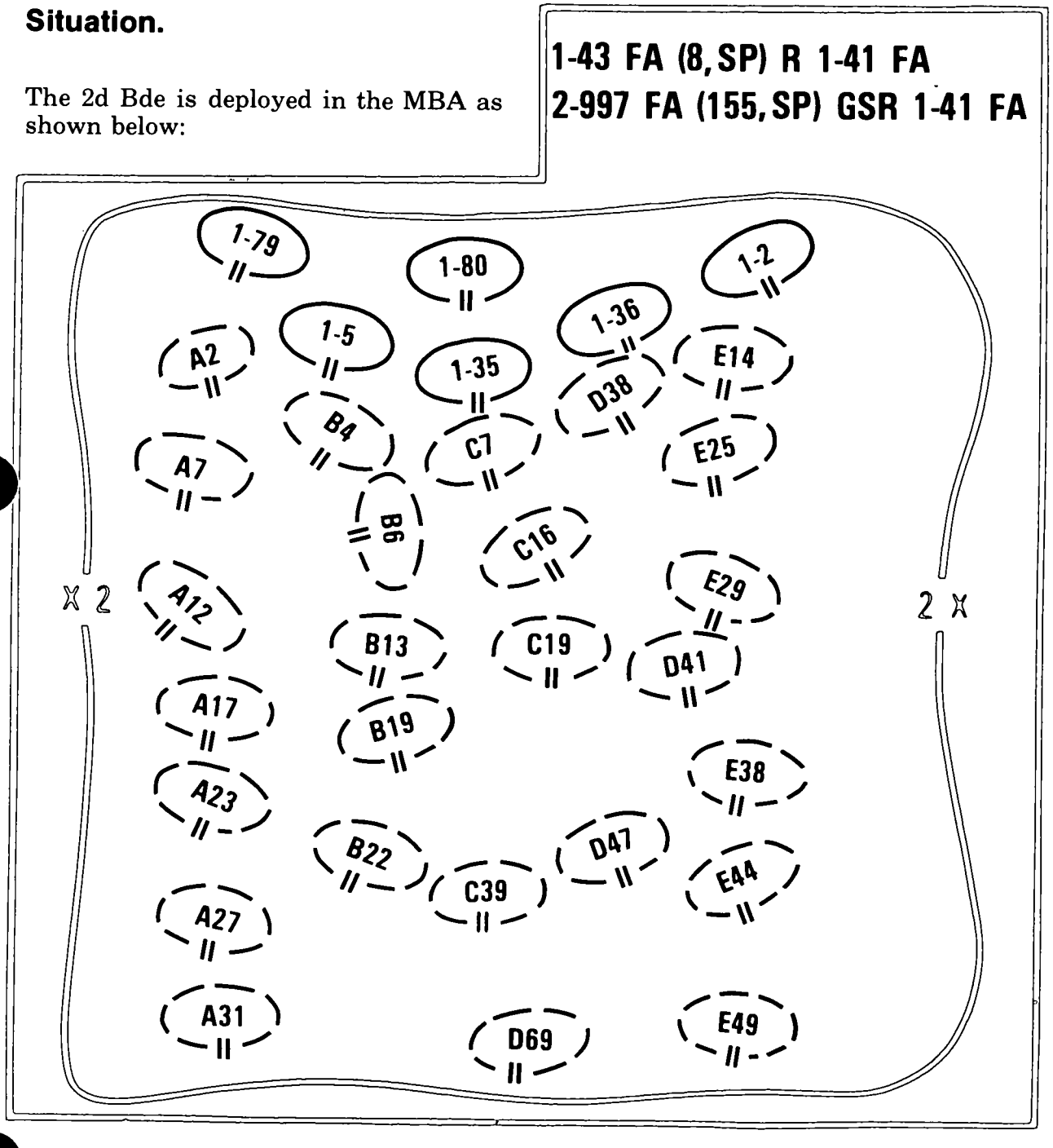
During the covering force fight, field artillery supports covering force elements by—

- Engaging enemy forces well forward of initial covering force positions.
- Firing in support of disengaging/repositioning maneuver forces.
- Maintaining a continuous firing capability during displacements.
- Providing immediate counterfire.
- Planning fires as an economy of force measure in less threatened areas.
- Planning fires to support obstacles.
- Planning to provide continuous field artillery support during change of control.

Main Battle Area Scenario

Situation.

The 2d Bde is deployed in the MBA as shown below:



The enemy is massing for his breakthrough attempt with two divisions in the first echelon followed by two more divisions in the second echelon. The enemy's main effort is directed at 2d Bde's battle area.

Field artillery organization for combat.

As part of the initial planning effort, the commander, 1-41 FA (DS 2d Bde), and his S3 must analyze the field artillery organization for combat and the resulting implications.

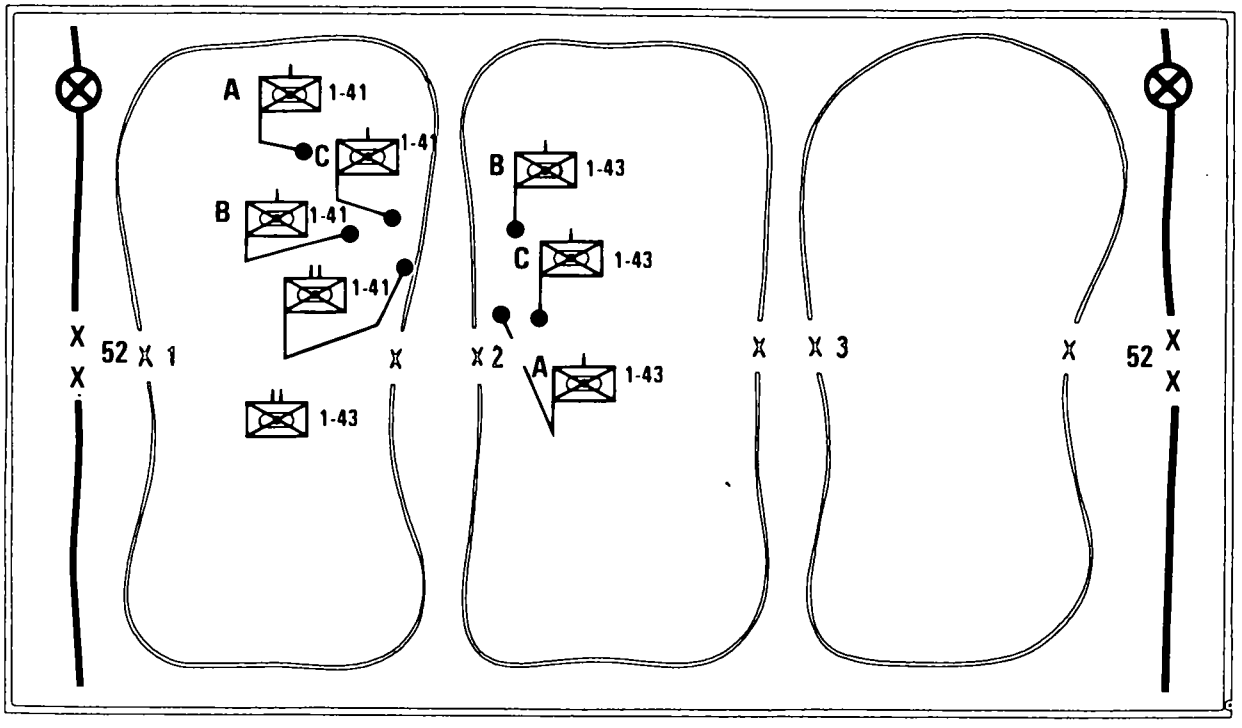
- **1-43 FA (8, SP) is reinforcing 1-41 FA. 1-41 FA has first priority on their fires, positioning, and fire planning authority.**
- **The three batteries of 1-43 FA should be included in the field artillery fire planning effort, giving 1-41 FA a total of six batteries for which it can plan fires.**
- **1-43 FA should be an addressee for all plans and orders published by 1-41 FA.**
- **1-43 FA (reinf) was initially deployed as part of the covering force field artillery and may have suffered significant personnel and equipment losses. Until these losses can be replaced, the battalion may be operating at less than full capability.**
- **2-997 FA (155, SP) is general support reinforcing 1-41 FA. 1-41 FA has second priority on their calls for fire.**

Positioning considerations.

The commander, 1-41 FA, issues the following guidance to his S3 regarding positioning of 1-41 FA (DS) and 1-43 FA (reinf).

"The covering force has confirmed that the main effort is coming in 2d Bde's area. S3, I want our next positions to be on the west side of that effort in 1st Bde's zone if necessary. Its zone is the least congested, and real estate shouldn't be at a premium. Coordinate this through the 1st Bde FSO. Coordinate the positions with the division artillery S3 to make sure they complement the overall lateral repositioning scheme. Plan to move by echelon and coordinate all moves with division artillery. Tell the batteries to move cross country when possible, just in case lines of communication become congested with refugees and CSS elements."

Based on the commander's guidance, the S3 selected positions for 1-41 FA and 1-43 FA as shown below.



Employment of target acquisition.

1-41 FA has one weapon locating radar attached from the division artillery target acquisition battery. The S2 has positioned the radar close to C/1-41 FA's location. The position is close enough to the FEBA to permit the S2 to orient the radar to where the enemy can be expected to concentrate his indirect fire systems. The location chosen for the radar is also in 1st Bde's zone. Coordination of the selected radar position should be coordinated with 1st Bde at the same time that the locations for 1-41 FA are coordinated.

Division artillery has positioned a sound/flash base in the approximate area of 1-41 FA's location (the position for the base was also coordinated with 1st Bde). The base will send target locations direct to division artillery.

Field artillery fire planning.

The initial fire planning effort will be directed toward assisting covering force elements as they move into the MBA. Both TF 1-4 and TF 1-3 will pass into 2d Bde's area and will be looking to 1-41 FA (DS) for field artillery support. The FSOs with the task forces will be planning targets along designated movement routes and submitting them to 1-41 FA FDC to be planned as on-call targets. The 2d Bde FSO is planning on-call targets forward of the MBA. These targets are based on terrain analysis and targeting information received from covering force elements.

The S3, 1-41 FA, has instructed the S2 and the operations sergeant to prepare a counterfire program on known or suspected enemy indirect fire systems. The brigade FSO inputs targets for the program based on where the brigade commander plans to concentrate his forces to react to the main effort.

Covering force elements continue to fight toward designated passage points into the MBA. 1-41 FA (DS), 1-43 FA (reinf),

and 2-997 FA (GSR) have occupied positions in the MBA; 1-41 FA has established FM communications with FISTs in the covering force moving into 2d Bde's area. The 2d Bde FSO notifies the S3, 1-41 FA, that 2d Bde has assumed control of covering force elements forward of the brigade.

Fires in support of an isolated maneuver element.

The FSO, TF 1-4, reports that elements of Team A and its FIST have been cut off and are isolated. TF 1-4 commander designates a restrictive fire area around the Team A location, and the FSO passes the RFA to 1-41 FA.

The FIST with Team A and the team commander select targets to support the team's breakout and movement toward the MBA. These targets are to be fired as called for by the FIST chief and are assigned to A/1-41 FA and B/1-41 FA as on-call targets. The FIST calls for the targets to be fired, and under cover of these fires, the team executes a breakout and moves toward the MBA. Team A's route is covered by on-call targets.

Counterfire engagement.

The S3, 1-41 (DS), briefs the FDO as follows regarding counterfire planning and engagement.

"We need to keep our countermortar program current. Make sure that we purge old mortar locations as the battle develops. Don't fire the program until you can substantiate that the requesting unit is, in fact, under indirect fire attack and not just taking a few sporadic rounds. Remember, the enemy likes to employ his 122 howitzers in the direct fire role. If the FISTs can visually locate 122s firing direct fire, we attack them immediately as visually acquired direct fire weapons, not counterfire targets."

TF 1-79 (2d Bde) reports heavy incoming artillery and mortar fire and the S3, 1-41 FA (DS), notifies division artillery and reports the type of incoming rounds and approximate azimuth (if known). The S2 had both weapon locating radars oriented. He transmits cuing instructions to the radars and both radars begin scanning. One of the radars reports the locations of a mortar position and the FDO sends the grid to A/1-41 FA for engagement with a battery four, HE/PD and VT. The sound/flash base also acquires two targets and division artillery is engaging them with GS and GSR artillery. Nine minutes after the indirect fire attack commenced, TF 1-79 reports INCOMING CEASED.

Fires in support of strongpoints.

TF 1-36 is in a battle position that includes a strongpoint occupied by Team A. The other two teams in the task force are in positions on the flanks of the strongpoint. Massed fires from 1-41 FA are planned in the gaps between the strongpoint and flanking teams. Final protective fires are planned around the perimeter and "fired in" by the FIST. (FPFs are discussed in FM 6-20, appendix H.) As enemy tanks and BMPs come into sight, the FSO times their rate of advance and requests a battalion mass, one volley, HE/VT, and DPICM from 1-41 FA. The enemy force deploys, attempting to bypass the strongpoint. The personnel manning the strongpoint open fire on the advancing element along with the flanking teams, 1-41 FA fires the gaps, and the enemy force attempts to withdraw. The task force then shifts the fires of 1-41 FA onto the remnants of the enemy force as the task force counterattacks by fire. This combination of firepower eliminates the enemy force.

Massing fires in the MBA.

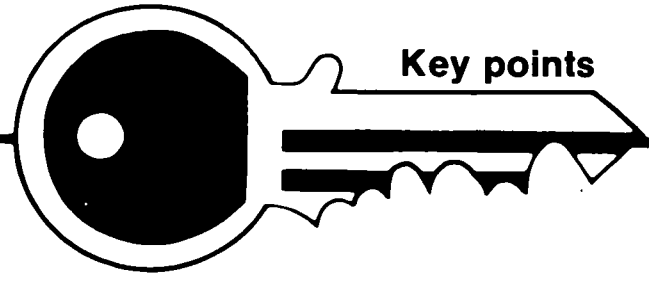
As part of his planning effort, the 2d Bde FSO in concert with the brigade S2 has planned mass fires on several targets located on avenues of approach that could accommodate large armor formations. Based on the FSO's recommendation, the 2d Bde has also requested planned offensive air support on these targets. The FSO sends the targets to 1-41 FA (DS) and requests that they be planned on call, "all available." 1-41 FA FDO transmits the targets to 1-43 FA (reinf) and 2-997 FA (GSR) and requests that they be planned as battalion "mass" missions. As the battle continues, 2d Bde receives a report of a large armor formation moving at high speed toward one of the predicted target areas. The FSO, after briefing the brigade commander, contacts 1-41 FA FDC and requests that the battalion stand by to fire the target with all available FA "at my command." 1-43 FA is on 1-41 FA CF net and monitors the request. The liaison officer passes the request to 2-997 FA on the "quick-fire channel." When the armor force approaches the target area, the FSO gives the command to fire. Fires continue until the CAS is on station and then fires are shifted to suppression of enemy air defense targets along planned routes while the airstrike is delivered. When the airstrike is completed, field artillery fires are shifted back on the target area. The combined massed field artillery and CAS succeed in slowing the enemy advance and provide time for the 2d Bde commander to shift his forces to destroy the enemy in the penetration.

Field artillery support for economy of force areas.

The division has economized forces in the 1st Bde area in order to concentrate forces in the 2d Bde area. One FA battalion is DS to 1st Bde. The DS battalion can request additional fires from GS and GSR artillery through division artillery, but it is doubtful that reinforcing artillery would be available.

☐ Field artillery support considerations in economy of force areas will not differ greatly from field artillery support provided to maneuver forces in the area of concentration. Special considerations for field artillery support in economy of force areas in the active defense are:

- Movement *must* be by echelon or battery since reinforcing field artillery is not available.
- Fires should be planned on avenues of approach that enter the flank of the economy of force brigade from the area of the main effort.
- The economy of force brigade's capability to mass maneuver forces will be limited. The brigade will be dependent on massed field artillery and mortar fires to "plug the gaps." This is especially true should a supporting attack develop in these areas.



Key points

During the MBA fight, field artillery supports MBA maneuver elements by—

- Firing defensive fires.
- Planning and executing counterfire.
- Firing at attacking mechanized forces at the request of FISTs/FSOs.
- Massing fires in the MBA.
- Firing in support of isolated forces.
- Firing in support of strongpoints.
- Massing fires on the enemy second echelon.
- Providing field artillery support to economy of force areas in the MBA.

APPENDIX G:

Glossary

ABCA	American, British, Canadian, and Australian
ACA	airspace coordination area
AD	air defense
ADA	air defense artillery
ADFT	artillery direct fire trainer
AGI	annual general inspection
AIT	advanced individual training
ALO	air liaison officer
AM	amplitude modulated
ARTEP	Army Training and Evaluation Program
ASP	ammunition supply point
AT	arrival time
ATG	antitank gun
ATGM	antitank guided missile
ATP	ammunition transfer point
AVLB	armored vehicle launched bridge
BCT	basic combat training
BNCOC	basic noncommissioned officer course
CATF	commander, amphibious task force
CAS	close air support
CBR	chemical, biological, and radiological
CE	communications-electronics
CEQI	Communications-Electronics Operation Instructions
CEP	circular error probable
CESO	communications-electronics staff officer
CF	command fire
CFA	covering force area
CLF	commander, landing force
COMSEC	communications security
COP	combat outpost
COSCOM	corps support command
CP	command post
CSR	controlled supply rate
CSS	combat service support

CT	completion time
CTA	common table of allowances
DAP	distant aiming point
DF	direction finding
DISCOM	division support command
DME	distance-measuring equipment
DMMC	division materiel management center
DS	direct support
DTG	date-time group
DTO	division transportation officer
DZ	dropping zone
ECCM	electronic counter-countermeasure
EDRE	emergency deployment readiness exercise
EEFI	essential elements of information
EEI	essential elements of friendly information
ELSEC	electronic security
EMP	electromagnetic pulse
EW	electronic warfare
EXTAL	extra time allowance
FA	field artillery
FAAO	field artillery aerial observer
FAC	forward air controller
FADAC	Field Artillery Digital Automatic Computer
FASC	forward area signal center
FASCO	forward area support coordinator
FDC	fire direction center
FDO	fire direction officer
FEBA	forward edge of the battle area
FFE	fire for effect
FIST	fire support team
FM	frequency modulated
FO	forward observer
FPF	final protective fire
FS	fire support
FSCOORD	fire support coordinator
FSE	fire support element
FSO	fire support officer
FSOP	field standing operating procedure
FTX	field training exercise
GFT	graphical firing table
GMET	Graphical Munitions Effects Table
GS	general support
GSR	general support reinforcing
HA	high angle
HB	high burst
HC/ti	hexachloroethane (smoke)/time
HE	high explosive
HE/CP	high explosive/ concrete piercing
HE/PD	high explosive/ point detonating
HES	high explosive spotting
HE/ti	high explosive/time

HE/VT	high explosive/variable time
HHB	headquarters and headquarters battery
HOB	height of burst
HQ	headquarters
HUMINT	human intelligence
IAW	in accordance with
ICM	improved conventional munitions
ICM/AP	improved conventional munitions/ antipersonnel
ICM/DP	improved conventional munitions/dual purpose
IR	infrared
JMEM	Joint Munitions Effectiveness Manual
kmih	kilometers in the hour
kmph	kilometers per hour
LC	line of contact
LD	line of departure
LFM	landing force manual (Marine Corps)
LO	liaison officer
LZ	landing zone
MBA	main battle area
MCC	movement control center
MCI	meal, combat, individual
MEDEVAC	medical evacuation
MMC	materiel management center
MOPP	mission oriented protection posture
MOS	military occupational specialty
MP	military police
mph	miles per hour
MPI	mean point of impact
MTOE	modified table of organization and equipment
MTLR	moving target locating radar
MU	march unit
NATO	North Atlantic Treaty Organization
NBC	nuclear, biological, chemical
NCO	noncommissioned officer
NCS	net control station
NGF	naval gunfire
NSI	nuclear surety inspection
OEG	operational exposure guidance
OIR	other intelligence requirements
o/o	on order
OP	observation post
OPORD	operation order
OPSEC	operations security
ops/FDC	operations/fire direction center
ORE	operation readiness evaluation
ORT	operational readiness training
OSUT	one-station unit training

PAC	personnel administration center
PD	point detonating
PL	phase line
PLL	prescribed load list
PNCOC	primary noncommissioned officer course
PNL	prescribed nuclear load
POL	petroleum, oils and lubricants
PST	pass time
PX	post exchange
PW	prisoner of war
Q	quick (fuze)
QE	quadrant elevation
QSTAG	Quadripartite Standardization Agreement
RATT	radioteletypewriter
RDF	radio direction finding
RFA	restrictive fire area
RFL	restrictive fire line
RP	release point
RSR	required supply rate
RT	radius of target
RTO	radiotelephone operator
RWI	radio wire integration
SAEDA	subversion and espionage directed against the Army
SEAD	suppression of enemy air defense
SEDME	surveying equipment, distance measuring, electronic
SHELREP	shelling report
SIGSEC	signal security
SOJT	supervised on-the-job training
SOP	standing operating procedure
SP	self-propelled; start point
SQT	skill qualification test
S&T	supply and transportation
STANAG	Standardization Agreement
TA	target acquisition
TAB	target acquisition battery
TAC SOP	tactical standing operating procedure
TASC	Training and Audio-visual Support Center
TDIS	time distance
TEC	training extension course
TEWT	tactical exercise without troops
TF	task force
TGPC	terrain gun position correction
TLE	target location error
TOC	tactical operations center
TOE	table of organization and equipment
TOT	time on target
USAF	United States Air Force
USAFAS	United States Army Field Artillery School

UTM	universal transverse mercator (grid)
VE	velocity error
VPKM	vehicles per kilometer
VPM	vehicles per mile
VT	variable time
VT/DPICM	variable time/dual purpose improved conventional munitions
WP	white phosphorus
WLR	weapon locating radar
WPM	words per minute
WP/PD	white phosphorus/ point detonating

APPENDIX H:

Relevant References

Department of the Army pamphlets.

310-3	Index of Doctrinal, Training, and Organizational Publications

Field manuals.

3-10	Employment of Chemical Agents
3-12	Operational Aspects of Radiological Defense
3-22	Fallout Prediction
5-100	Engineer Combat Operations
6-1	The Tactical Fire Direction System (TACFIRE)*
6-2	Field Artillery Survey
6-15	Field Artillery Meteorology
6-20	Fire Support in Combined Arms Operations
6-40	Field Artillery Cannon Gunnery
6-50	The Field Artillery Cannon Battery
6-121	Field Artillery Target Acquisition
6-141-1	Field Artillery Target Analysis and Weapons Employment (Nonnuclear)
7-20	The Infantry Battalion
11-50	Combat Communications Within the Division
17-95	Cavalry
20-22	Vehicle Recovery Operations

*To be published.

21-6	How to Prepare and Conduct Military Training
21-40	NBC Defense
24-1	Combat Communications
24-17	Tactical Telecommunications Center Operation
30-102	Opposing Forces Europe
71-1	The Tank and Mechanized Infantry Company Team
71-2	The Tank and Mechanized Infantry Battalion Task Force
71-100	Armored and Mechanized Division Operations
100-5	Operations
100-50	Nuclear Unit Operations in Combat
101-5	Staff Organization and Operations
101-31-1	Staff Officer Field Manual: Nuclear Weapons Employment Doctrine and Procedures
101-31-2	Staff Officer Field Manual: Nuclear Weapons Employment Effects Data (U)

Training circulars.

6-1	TACFIRE
6-4-2	The Threat—Organization, Tactics and Equipment
6-10-1	Field Artillery Communications
6-20-9	Field Artillery Cannon Battery Defense
6-20-10	FIST: The Fire Support Team
6-121	Field Artillery Target Acquisition
11-5	What's Up: Know How to Repair and Fabricate Antennas
21-5-7	Training Management in Battalions
100-10	Combat Service Support in Battle*

Standardization agreements.

2101	Principles and Procedures for Establishing Liaison
2129	Recognition and Identification of Forces on the Battlefield
2099	Fire Coordination in Support of Land Forces

*To be published

Army training and evaluation program

6-165	General Support Cannon Units
6-365	Field Artillery Battalion Direct Support Cannon Units

APPENDIX I

Standardization Agreement 2129

NATO UNCLASSIFIED

Agreed English/French Texts

STANAG 2129
(Edition No. 3)

NAVY/ARMY/AIR

NATO STANDARDIZATION AGREEMENT (STANAG) RECOGNITION AND IDENTIFICATION OF FORCES ON THE BATTLEFIELD

Annexes: A. Suggested Methods of Challenges and Replies
B. Challenging by Guards and Sentries

Related documents: STANAG 2020(OP) - Operational Situation Reports.
STANAG 2027(OP) - Marking of Military Vehicles.
STANAG 2099(ARTY) - Fire Coordination in Support of Land Forces.
STANAG 3736(TAO) - Offensive Air Support Operations - ATP-27.

Allied Communications Publication 150 - Recognition and Identification Instructions, Air, Land, and Sea Forces.

NATO UNCLASSIFIED

AIM

1. The aim of this agreement is to standardize, for use by the NATO Forces, the procedures to be used for the recognition and identification of forces on the battlefield.

AGREEMENT

2. It is agreed that the NATO Forces are to use the procedures described in this STANAG for the recognition and identification of forces on the battlefield.

GENERAL

3. The scope of this agreement is to state the procedure for recognition and identification on the battlefield of the NATO Forces operating on land by:

a. Personnel on the ground, either on foot or in vehicles, by day or night.

b. Crews of airborne vehicles.

4. This agreement covers only the traditional means which are easily transportable and simple to operate.

DEFINITIONS

5. The following terms and definitions are used for the purpose of this agreement:

a. ***Ground by Ground.*** Ground by ground is defined as the recognition by ground units of other ground objects, personnel, vehicles and units. It includes recognition of objects close to the land like hovercraft and elevated platforms.

b. ***Ground by Air.*** Ground by air is defined as the recognition by airborne sensors and visual reconnaissance of objects, personnel and vehicles located on or close to the ground.

STATEMENT OF DETAILS

6. **Identification Signals.** Identification may be established and recognition effected as follows:

a. ***Appearance.*** (Personnel and Equipment). The silhouette, colour, markings, lay-out and general visual effect of elements conforming to prescribed arrangements.

b. ***Behaviour.*** Direction and manner of movement, speed, use of armament and type of formation. Identification or recognition by behaviour requires a good tactical knowledge of the current situation, e.g. knowledge of the movement plan of friendly forces.

c. ***Signals.*** By the use of:

(1) Any type of signal used in accordance with a prescribed plan or key. (See ACP 150 and STANAGs 2027 and 3736).

(2) The correct use of the challenge and reply. (See Annex B).

d. ***Position.*** The knowledge of the location of friendly objects or elements in reference to clearly recognized terrain features and the limits of prescribed operating areas for specific friendly elements. Fire support coordination lines (FSCL) and artificial landmarks can be used for recognition and identification of ground elements. The method by which the FSCL is fixed and communicated to all forces is laid down in STANAG 2099 and forms part of the operational plan for air support. Ground elements are responsible for laying out artificial landmarks for ground by air recognition and identification after coordination of time and place with air commanders. Recognition of a unit designated by position and track may be determined by its coincidence, or the coincidence of its radar plot with:

(1) A position received by a situation report (SITREP) (See STANAG 2020) or Forward Line Own Troops (FLOT) Message (See STANAG 3736).

(2) The reported position of a unit designated as friendly or hostile by a competent authority.

7. **Procedures.** The following steps apply:

a. ***Detection.*** Detection includes the awareness, by any means, of a new object or activity in the area.

b. ***Inspection.***

(1) This includes the inspection of the object or activity by any means and challenging if appropriate.

(2) The need to avoid attracting the attention of the enemy normally requires one party seeking to recognize another to observe without being seen, i.e. without making any visual or sound signal (one-sided direct observation). It is therefore necessary that all personnel be trained in the recognition of both friendly and enemy forces likely to be met on the battlefield, by a knowledge of the appearance of uniforms, equipment and vehicles. Vehicle markings are prescribed in STANAG 2027.

c. ***Recognition.*** This is the determination by any means of the friendly or enemy character, or the individuality of another. The establishment of the friendly or hostile character of the object or activity may include the appropriate reply to a challenge.

8. **Challenge and Reply Systems.** Both challenge and reply systems should contain a variety of methods. The code must be periodically changed and be given a wide national and international distribution. Signal instructions provide the necessary means for this distribution. This procedure, which compels the challenging party to show themselves, entails a risk. Suggested challenge and reply methods are listed in Annex A. The selected systems must be effective by day, by night and in conditions of poor visibility. The method of challenging to be used by guards and sentries is at Annex B.

9. **Limitations.** Recognition and identification signals may become known to the enemy. They are therefore to be regarded as evidence but NEVER as proof of friendly character. Conversely, friendly personnel may not, in all instances, know the current reply to a challenge. Therefore, the failure to give a correct reply to a challenge must not be taken as proof of enemy character. No challenge is to be made until ready to take offensive action. The use of recognition or identification signals establishes the originator's friendly character to a friendly unit, and immediately indicates his hostile nature to an enemy. Normally, visual emergency identification signals are a low security means of indicating friendly character. Emergency identification signals must be verified by the prescribed signals if practicable.

10. **Exchange of Information on Identification and Recognition.** Positive recognition of friendly forces operating on the battlefield must be based on the exact knowledge of uniforms, equipment and vehicles used by such forces.

11. NATO nations should exchange among themselves and/or furnish to the Major NATO Commanders (MNC) and the Major Subordinate Commanders (MSC) all necessary information about the appearance and identification symbols of their forces and equipment when in a combat role.

12. **Command Responsibility.** All NATO Commanders have the responsibility to ensure that all personnel under their operational command are trained in the recognition of both friendly and enemy forces likely to be met on the battlefield.

13. The Supreme Allied Commanders, or Commanders designated by them, are responsible for prescribing the challenges and replies to be used. This includes the use of challenges and replies during operations, and for training purposes. Allied Communications Publication 150 provides additional information and guidance.

IMPLEMENTATION OF THE AGREEMENT

14. This STANAG will be considered to have been implemented when the necessary orders/instructions putting the procedures detailed in this agreement into effect have been issued to the forces concerned.

ANNEX A TO STANAG 2129
(Edition No. 3)

SUGGESTED METHODS OF CHALLENGES AND REPLIES

CHALLENGES TO BE MADE BY A GROUND UNIT

1. **Visual Challenges.** These include, but are not limited to:
   a. Smokes. (Coloured smoke, shell bursts, pyrotechnics etc.).
   b. Lights. (Vehicle lights, spot lights, torches, Very lights, Signal flares etc.).
   c. Panels, flags, markings etc.
2. **Sound Challenges.** These include but are not limited to:
   a. Voice.
   b. Vehicle horns, sirens, bugles, whistles etc.
   c. Codes bursts of fire.

3. **Electronic Challenges.** These include but are not limited to:
   a. Radio.
   b. Radar.
   c. Infra-red.
   d. Laser.

CHALLENGE TO BE MADE BY AN AIRBORNE VEHICLE

4. Challenges by crews or airborne vehicles include, but are not limited to:
   a. Significant behaviour, such as over-flying with dipping wings, aircraft light signals or particular flight pattern.
   b. Use of Very lights. (Signal flares).
   c. Loudspeaker challenge.

5. It is the responsibility of the crew of the airborne vehicle to initiate the challenge by a prescribed means.

REPLIES

6. The means for challenging listed in paragraphs 1, 2, 3 and 4 also are available for replies.

7. Additional means include, but are not limited to:
   a. Radio call on a stipulated frequency.
   b. The display of panels as prescribed in standard operating instructions.
   c. The pre-arranged display of individual panels by ground parties.

COMBINATIONS

8. It is necessary that the challenge and reply codes include several permitted combinations, in order that a friendly party without a particular equipment would not be considered hostile.

ANNEX B TO STANAG 2129
(Edition No. 3)

CHALLENGING BY GUARDS AND SENTRIES

DEFINITIONS

1. The following terms are defined for the purpose of this annex:

a. ***Password.*** A combination of two words, the first being the challenge, the second the reply.

b. ***Challenge.*** The first word of a password.

c. ***Reply.*** The second word of a password.

METHOD

2. The verbal method of challenging (see paragraph 2.a. of Annex A to STANAG 2129) is the one most commonly used to identify unknown persons approaching a position. It is based on a password, which changes daily at a specified time, and which is common within national formations, or within specified command groupings, or areas.

3. The words used to form a password should be easily pronounceable. The combination selected should not have an obvious connection from which, given the challenge, the reply could be guessed.

4. The password is decided upon at the highest applicable level of command, and notified in advance to subordinate formations and units. Neighbouring and higher formations are also to be informed.

5. When forces of two or more nations are in the same formation, or area, great care is necessary to ensure that the password chosen is pronounceable by the nationalities concerned. In these circumstances the phonetic alphabet could be used, i.e.

Challenge - BRAVO **Reply - FOXTROT**

It may be ordered, for the sake of clarity, that the challenge and reply each be repeated once.

PROCEDURE

6. The following procedure is to be used:

	Action by Sentry	Action by Persons or Group Challenged
a.	Alerts his immediate commander of the approach of a person/group, and covers him/them with his weapon.	
b.	Waits until the person/group approaching is within audible range, but not so close that the position can be rushed, and then orders him/them to stop with the command "HALT-HANDS UP".	Halts, raises hands.
c.	Orders by voice or sign one person to approach - "ADVANCE ONE"	Person (or group leader) advances towards sentry's position.
d.	Allows the unknown person to approach close enough for visual recognition, or to give the challenge in a quiet voice, and then orders him to stop - "HALT".	Halts.
e.	Gives the challenge quietly - e.g. "BRAVO" - if he does not recognize the person.	Gives the reply - e.g. FOXTROT
f.	Calls forward the remainder of the group, either as individuals - "ADVANCE ONE" - or altogether - "ADVANCE" - as the situation or his orders dictate.	Second unknown person, or the remainder of the group, advances to be recognized by the sentry, assisted by the group leader who stays with the sentry until all have passed.

FIRING BY SENTRIES

7. The circumstances under which a sentry is to be instructed to fire on persons or groups failing to heed a challenge is left to national authorities and must, necessarily, vary depending upon the particular situation and the laws of the countries concerned.

FM 6-20-1

5 JULY 1979

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Major General, United States Army
The Adjutant General

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